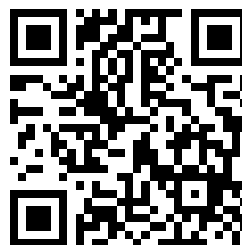

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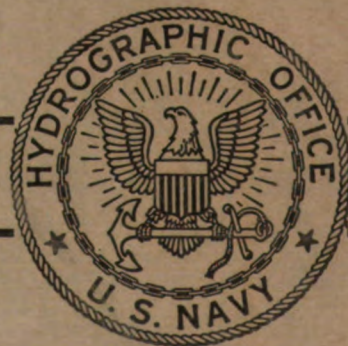
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SAILING DIRECTIONS

THE BALTIC
VOL. II

H. O. Pub. No. ~~142~~

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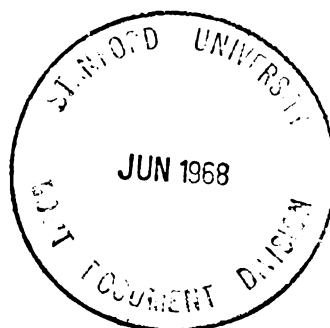
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SAILING DIRECTIONS

for

THE BALTIC, VOL. II

5th Edition, 1967



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43**

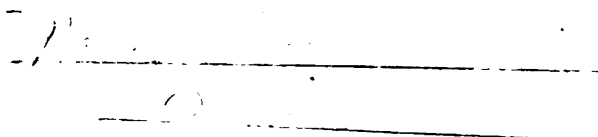
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LIST OF EFFECTIVE PAGES

Pub. No. 63 — Fifth Edition, 1967
(Revised Edition, 1976)

This list supersedes any previous list.

EXPLANATION

- 19 Original book page. Only odd-numbered pages are listed; their reverse sides are taken for granted unless otherwise noted.
- 19-3 Change page from Change No. 3. It replaces previously effective page 19.
- 20a-3 Additional book page included in Change No. 3. Pages 20b, 20c, etc., if included, are inserted in alphabetical order.

PAGES REQUIRED IN COMPLETE BOOK

Title Page	XI (Rev. Blank)	XIX
III	XIII	XXI
V (Rev. Blank)	XV	XXIII
VII (Rev. Blank)	XVII	XXV (Rev. Blank)
IX (Rev. Blank)		

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LIST OF EFFECTIVE CHANGES

This list supersedes any previous list. The effective pages of each listed Change must be applied to bring this publication up to date. Previous Changes not listed are no longer effective.

Change Nos. 1 and 2 have been cancelled by this Revised Edition.

This Revised Edition has been corrected through Notice to Mariners 10 of 6 March 1976.

LIST OF EFFECTIVE PAGES

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3			
5			
7			
9 (Rev. Blank)			
11			
13			
15			
17			
19			
21			
23			
25			
27			
29			
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49			
51			
53			
55			
57			
59			
61			
63			
65			
67			
69			
71			
73			
75			
77 (Rev. Blank)			
79			
81			
83			
85 (Rev. Blank)			
87			
89			
91			
	92a (Rev. Blank)	181 (Rev. Blank)	271
	93	183 (Rev. Blank)	273
	95	185	275
	97	187	277
	99	189	279
	101	191	281
	103	193	283 (Rev. Blank)
	105	195	285 (Rev. Blank)
	107	197	287
	109	199	289
	110a (Rev. Blank)	201	291
	111	203	293
	113	205	295
	115 (Rev. Blank)	207	297
	117	209	299
	119	211	301
	121 (Rev. Blank)	212a (Rev. Blank)	303
	123	213	305
	125	215	307
	127	217 (Rev. Blank)	309
	129	219	311
	131	221	313
	133	223	315
	135	225	317 (Rev. Blank)
	137	227	319
	139	229	321
	141	231	323
	143	233	325
	145	235	327
	147	237	329
	149	239	331
	151	241	333
	153	243	335
	155 (Rev. Blank)	245	337 (Rev. Blank)
	157 (Rev. Blank)	247	339 (Rev. Blank)
	159	249 (Rev. Blank)	341
	161	251 (Rev. Blank)	343
	163	253	345
	165	255	347
	167	257	349
	169	259	351
	171	261	353
	173	243	355
	175	265	357 (Rev. Blank)
	177	267	359 (Rev. Blank)
	179	269	361

H. O. PUB. 43

SAILING DIRECTIONS
FOR
THE BALTIC
VOLUME II

**Baltic Sea from Falsterboudde and Kap Arkona
to the Gulfs of Finland and Bothnia**

**Fifth Edition
1967**

**Published by the U. S. Naval Oceanographic Office
under the authority of the Secretary of the Navy**



For Sale by authorized Sales Agents of the U. S. Naval Oceanographic Office
Price, including ring binder\$4.50
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HOW TO KEEP THIS BOOK CORRECTED

As initially published, this book contains material based upon information available in the U.S. Naval Oceanographic Office through the date given in the preface. Subsequently it should be brought up to date by replacing obsolete pages with loose-leaf change pages, which are published at appropriate intervals in consecutively numbered sets called Changes. A later Change does not automatically cancel an earlier Change, therefore each Change must be inserted in sequence as published; eventually the book will contain change pages from several different Changes. A revised List of Effective Pages included in each Change lists the correct pages comprising the complete book. The publication of new Changes, which normally occurs every twelve to eighteen months, is announced in Notice to

Mariners. Instructions for ordering Changes will be found in the front part of the book.

In the interval between Changes, information that may amend material in this book is published in the weekly Notice to Mariners. The Notice to Mariners number and paragraph number should be marked on applicable pages, as indicated by the page number at the end of each paragraph. This information should also be recorded on the Chart/Publication Correction Record Cards (NHO 5610/2) for the affected pages. The Notice to Mariners should be kept intact and reference made to it as required. Book owners will be placed on the Notice to Mariner mailing list on request to the U.S. Naval Oceanographic Office, Washington, D.C. 20390.

PREFACE

This is H.O. Pub. 43, the fifth edition of *Sailing Directions for the Baltic*, Vol. II. As originally published it is corrected to November 25, 1967, including Notice to Mariners 47 of 1967. This new edition replaces the fourth edition which was originally numbered H.O. Pub. No. 142.

The principal sources examined in the preparation of this publication were:

Svensk Lots, Allmänna Upplysningar, 1960, with Supplement No. 1, 1961.

Svensk Lots, Del. II, 1959, with Supplement, 1961.

Den Danske Havnelods, 1964, with Supplement No. 2, 1966.

Den Danske Lods, I, 1967.

Den Danske Lods, III, 1963, with Supplement No. 3, 1966.

Ostsee-Handbuch, Sudlicher Teil, Hamburg, 1959, with Supplement No. 3, 1966.

Für Brücke und Kartenhaus, 1963.

Locja Bałtyku, Czesło Południowa, Wybrzeże Polskie, Gdynia, 1963, with Supplement No. 1, 1966.

Instructions for Vessels calling at Soviet Ports of the Baltic Sea, Leningrad, 1964.

Baltic Pilot No. 19, Vol. II, London, 1965.

Reports from United States naval and merchant vessels and various shipping companies.

Charts, light lists, and various documents in possession of the department.

EXPLANATORY REMARKS

COASTAL DESCRIPTIONS.—Beginning with Chapter 2, chapters in this publication are divided into major divisions, or parts, consisting of relatively short sections of coast or of bays or gulfs, islands or island groups, sounds and channels, etc. Major divisions are normally arranged in geographic sequence according to the general plan of the book, and are subdivided, according to subject, into subordinate divisions, which are arranged in the order the various subjects would normally be considered by vessels operating in the area. For example, information normally required for navigating in the offing is given before that required for navigating close inshore, and outer dangers are described before those that fringe the coast. This arrangement makes reference to only the first few paragraphs of each major division covering a

particular coast necessary for normal offshore navigation, but progressively more study of the text is required as concern for coastal details increases, as when approaching close-to, entering port, or anchoring. The subordinate divisions are appropriately titled to aid in locating specifically required information, and their arrangement is designed to eliminate comprehensive reading if the various inshore details of a coast are of no concern.

GRAPHIC INDEXES.—A general index diagram showing the area described in this publication and the general limits of the various chapters is located in the front part of the book. An individual chapter index diagram showing an enlargement of the specific area described is located at the beginning of each chapter. These chapter indexes also show the limits of the best-scale charts issued to U.S. naval vessels by the Oceanographic Office and indicate the place in the text where a description of various designated localities begins. To find the description of a particular locality, simply refer to the general index to determine the appropriate chapter, and then refer to the particular chapter index, which will indicate by means of section numbers the place in the text where a description of the area that includes the particular locality begins.

BEARINGS are true, and are expressed in degrees from 000° (north) to 360°, measured clockwise. Bearings limiting light sectors are toward the light.

COURSES are true, and are expressed in the same manner as bearings. The directives "steer" or "make good" a course mean, without exception, to proceed from a point of origin along a track having the identical meridional angle as the designated course. Vessels following the directives must allow for every influence tending to cause deviation from such track, and navigate so that the designated course is continuously being made good.

Courses given throughout the text under the heading "Navigation" are as plotted on the best-scale chart of the locality, and they simply indicate a track that may be followed along the coast being described to avoid grounding. From suitable points on these coastal tracks, courses to ports or other places in the area are given wherever appropriate.

DISTANCES are expressed in nautical miles of 1 minute of latitude, or approximately 2,000 yards. Distances of less than 1 mile are expressed in yards or fractions of a mile. Decimals are occasionally used.

WIND DIRECTIONS are the true directions from which winds blow.

CURRENT DIRECTIONS are the true directions toward which currents set.

CHARTS shown on the graphic indexes at the beginning of each chapter are the largest-scale charts of the locality on issue to United States naval vessels by the Oceanographic Office. The Catalog of Nautical Charts and Publications shows complete Oceanographic Office chart coverage.

GEOGRAPHIC POSITIONS given at intervals throughout the text are approximate only and are intended to facilitate reference to the charts.

DEPTHS are referred to chart datum and are expressed in fathoms or feet.

HEIGHTS are referred to the plane of reference used for that purpose on the charts and are expressed in feet.

LIGHT AND FOG SIGNAL CHARACTERISTICS are not described, and light sectors are not usually defined. The Light Lists should be consulted for complete information.

RADIO NAVIGATIONAL AIDS and radio weather services are not described in detail. Publications Nos. 117B and 118B should be consulted.

REGULATIONS, signals, cautions, search and rescue operations, which are described in the Annual Special Notice to Mariners,

issued on 1 January, are not described in this publication.

GEOGRAPHIC NAMES are generally those used by the nation having sovereignty. The names and their spelling do not necessarily reflect recognition of the political status of an area by the government of the United States of America. Names in parentheses following another name are alternate or obsolete names that may appear on some charts. In general, alternate, or obsolete names are quoted only in the principal description of the place. Diacritical marks, such as accents, cedillas, and circumflexes, which are related to specific letters in certain foreign languages, are not used in the interest of typographical simplicity.

CORRECTIVE INFORMATION.—It is requested that the U.S. Naval Oceanographic Office, Washington, D.C. 20390, or any of its branch offices, be advised of any inaccuracy found in this publication or of additional navigational information considered appropriate for insertion. Various Oceanographic Office forms are available for this purpose.

DENSITY as used in this volume is equivalent to specific gravity. It is the ratio, at atmospheric pressure, of the weight of a given volume of sea water to that of an equal volume of distilled water at 39.2°F. (4.0°C.). Also, density is expressed as sigma-t, an abbreviated form wherein water whose density is 1.02450 would have a sigma-t value of 24.50. to convert from a sigma-t value to density, divide by 1,000 and add 1.

CONTENTS

	Page
How to keep this book corrected.....	II
Preface	III
Chartlet—Chapter Limits.....	VII
Record of Changes.....	IX
How to obtain Changes	XI
List of Effective Pages.....	XIII
The Short Correction System	XV
Appendix—Climatological Tables	299
Index.....	311
Conversion Table.....	323
Route Chart.....	Envelope at back of book
Index Chart—Limits of Sailing Directions	Envelope at back of book

Chapter 1

General Remarks—Buoyage—Signals—Pilotage—Regulations—Cautions—Oceanography—Climatology.....	1
---	---

Chapter 2

Falsterboudde to Torhamnsudde, Including Bornholm and Christianso.....	89
--	----

Chapter 3

Kalmarsund and Oland	125
----------------------------	-----

Chapter 4

Gotland, Faron, and Gotska Sandon	145
---	-----

Chapter 5

Kalmarsund to Landsort	163
------------------------------	-----

Chapter 6

Landsort to Simpnasklubb	185
--------------------------------	-----

Chapter 7

Kap Arkona to Rozewie.....	203
----------------------------	-----

Chapter 8

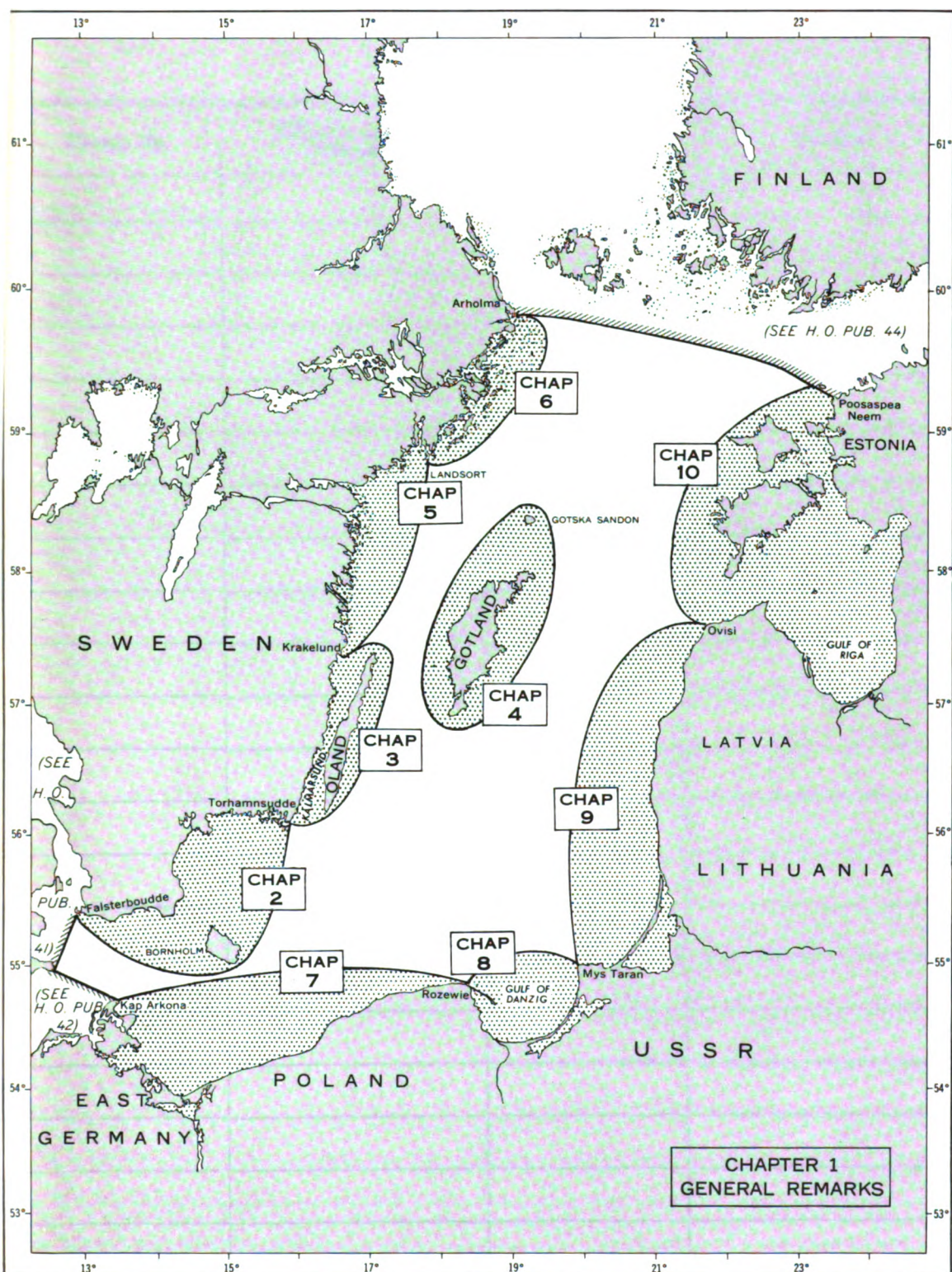
Gulf of Danzig.....	233
---------------------	-----

Chapter 9

Mys Taran to Ovisi	257
--------------------------	-----

Chapter 10

Gulf of Riga and Approaches.....	273
----------------------------------	-----



CHAPTER LIMITS—H.O. PUB. 43

RECORD OF CHANGES TO H.O. 43

Fifth Edition, 1967

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HOW TO OBTAIN CHANGES

Sales to General Public.—When this book is sold, all Changes in effect at the time are furnished at no extra cost. Subsequent Changes have a standard selling price of 35 cents each. Whenever possible, Changes should be bought from one of the local sales agents listed in Part I of the Catalog of Nautical Charts and Publications. If there is no sales agent available, Changes may be ordered by mail from the U.S. Naval Oceanographic Office, Washington, D.C., 20390 or from either of the Distribution Offices listed below. Such orders must be accompanied by check or money order made payable to the U.S. Naval Oceanographic Office. Postage stamps or Government Printing Office coupons cannot be accepted as payment. Changes will be mailed, postage paid, by regular mail. Special handling costs, such as air mail, special delivery, etc. must be borne by the purchaser.

In emergencies, Changes may be bought from one of the Branch Oceanographic Offices also listed in the catalog. Branch Offices do not handle mail orders.

Official U.S. Government Issues.—U.S. naval vessels and government activities on official distribution lists will receive Changes automatically upon publication. Government

activities not on the distribution lists should submit requests to the U.S. Naval Oceanographic Office, Washington, D.C., 20390 or to one of the Distribution Offices.

Mail orders from the Pacific Ocean area or west of the Mississippi River, except the Gulf of Mexico and the Canal Zone, should be sent to:

U.S. Naval Oceanographic Distribution
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Ogden, Utah, 84016

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H.O. Pub. No. 43—Fifth Edition, 1967
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EXPLANATION

- 19 Original book page. Only odd-numbered pages are listed; their reverse sides are taken for granted unless otherwise noted.
- 19-3 Change page from Change No. 3. It replaces previously effective page 19.
- 20a-3 Additional book page included in Change No. 3. Pages 20b, 20c, etc., if included, are inserted in alphabetical order.

PAGES REQUIRED IN COMPLETE BOOK

Title Page	VII (Rev. Blank)	XIII
III	IX (Rev. Blank)	XV (Rev. Blank)
V (Rev. Blank)	XI (Rev. Blank)	

Continued on reverse side

LIST OF EFFECTIVE CHANGES

*Future Corrective Changes will be published as required.

LIST OF EFFECTIVE PAGES

1	109	217
3	111	219
5	113	221
7	115	223
9	117	225
11	119	227
13	121	229(Rev. Blank)
15	123(Rev. Blank)	231(Rev. Blank)
17	125	233
19	127	235
21	129	237
23	131	239
25	133	241
27	135	243
29	137	245
31	139	247
33	141(Rev. Blank)	249
35	143(Rev. Blank)	251
37	145	253(Rev. Blank)
39	147	255(Rev. Blank)
41	149	257
43	151	259
45	153	261
47	155	263
49	157	265
51	159(Rev. Blank)	267
53	161(Rev. Blank)	269
55	163	271(Rev. Blank)
57	165	273
59	167	275
61	169	277
63	171	279
65	173	281
67	175	283
69	177	285
71	179	287
73	181	289
75	183(Rev. Blank)	291
77	185	293
79	187	295
81	189	297(Rev. Blank)
83	191	299
85(Rev. Blank)	193	301
87(Rev. Blank)	195	303
89	197	305
91	199	307
93	201(Rev. Blank)	309(Rev. Blank)
95	203	311
97	205	313
99	207	315
101	209	317
103	211	319
105	213	321(Rev. Blank)
107	215	323(Rev. Blank)
		Envelope containing route and index chart

THE SHORT CORRECTION SYSTEM

Although Change pages replacing obsolete pages represent the ideal correction system for loose-leaf books, the Short Correction system is used as a reasonable alternative when corrections are too small to justify replacing an entire page.

Short Corrections are intended to be kept intact in the front of the book for ready reference as needed. The previous option of cutting apart and pasting Short Corrections to affected pages has been discontinued in the interest of simplicity. Previous Short Corrections that remain effective are repeated in subsequent Changes, and both old and new corrections for any given page are grouped together for easy reference. Pages affected by Short Corrections that are new with this Change are listed below. It is recommended that the top of each affected book page be marked "See Short Corrections" as a reminder that a Short Correction applies.

Short Corrections are preceded by a code group which shows the applicable page number, column, line number, and first word of line affected. Unless otherwise indicated each Short Correction replaces the entire line or lines designated. Exceptions are self-explanatory.

Example: 429-L-10 (Island). The Short Correction applies to Page 429, left column, line 10. "Island", the first word of line 10, serves as a check on the line count.

CUMULATIVE SET OF SHORT CORRECTIONS

NOTE.—Short Corrections, if any, will be listed when changes are published.

CHAPTER 1

GENERAL REMARKS—BUOYAGE—SIGNALS—PILOTAGE—REGULATIONS—CAUTIONS— OCEANOGRAPHY—CLIMATOLOGY

PLAN

1-1 This publication comprises the area occupied by the southern part of the Baltic Sea between an imaginary line joining Fals-terboudde, Sweden, and Kap Arkona, Germany, to the southwest, and the entrances to the Gulf of Bothnia and Gulf of Finland to the north and northeast.

THE BALTIC

1-2 The Baltic, the name by which this inland sea is commonly designated, is known to the Swedes as "Ostersjon", to the Danes as "Osterson," and to the Germans as the "Ostsee", or East Sea. It is about 710 miles long from the Gulf of Danzig to the head of the Gulf of Bothnia. The northern part of the Baltic divides into the Gulf of Finland and the Gulf of Bothnia. The former extends about 240 miles eastward, the latter about 360 miles northward. Three channels lead from the southern part of the Baltic into the Kattegat and North Sea. The Baltic can also be reached by the Nord-Ostsee Kanal and inland waterways of the U.S.S.R. connecting the White Sea and Black Sea.

The southeastern shore of the Baltic is mostly low and sandy, with sandbanks offshore and sandhills and plains inland. Rivers and streams flowing into the Baltic in places form lakes (haffs) separated from the sea by narrow spits (nehrungs). Approaching the entrance of the Gulf of Finland, the shore becomes rocky and continues so around the Gulf of Bothnia except towards the heads of each gulf. The rocks, called "Skar" by the Swedes, seldom exceed 50 feet in height. The coast of the southern part of the Swedish Peninsula is moderately high, but not rocky.

Depths in the Baltic range from an average of 30 fathoms to over 100 fathoms eastward and northward of Gotland, with 240 fathoms about 48 miles northward of Gotland.

SWEDEN

1-3 GENERAL INFORMATION.—Sweden occupies the eastern part of the Scandinavian Peninsula. It is about 1,020 miles long, 100 to 200 miles wide, and has an area of about 174,000 square miles. The backbone of the Scandinavian Peninsula is a range of moun-

tains extending nearly the entire length of the peninsula, forming a natural boundary between Sweden and Norway.

Topographically, Sweden is divided into three regions: Norrland, Svealand, and Gotaland. Norrland, the northern part, is a region of mountains and high land, containing the principal rivers of the country. Svealand, the central lowlands, largely consist of wooded, fertile plains and numerous lakes. The largest of these lakes are Vanern, Vattern, Hjalmar, and Malaren. Southward and southeastward of the central lowlands lie the Smaland highlands, a region of wooded, rolling ridges over 300 feet high with many small lakes. Abutting southward lie the plains of Skane, cultivated level land broken by a series of gravel ridges extending northwestward and southeastward.

The coast of Sweden, northward of 56° latitude, is fronted by innumerable islands, rocks and shoals. Channels between these dangers lead to sheltered anchorages and harbors.

1-4 GOVERNMENT.—Sweden is a constitutional monarchy, the executive power being invested in the King who acts under the advice of a Council of State. The Parliament consists of two chambers elected by the people on a proportional representation. Stockholm is the administrative seat of government.

POPULATION.—Sweden, according to the 1960 census, had a population of 7,495,316. The cities of Sweden with the largest approximate population are Stockholm, Goteborg, and Malmo.

PORTS.—The principal port of Sweden described in this publication is Stockholm. Secondary ports are Ahus, Kalmar, Karls-hamn, Karlskrona, Norrkoping, Nykoping, Nynashamn, Oskershamn, Oxelosund, Ronneby, Simrishamn, Slite, Sodertalje, Solvesborg, Trelleborg, Vasteras, Visby, Vastervik, and Ystad.

INDUSTRY AND PRODUCTS.—Sweden is an agricultural and industrial country. Over 65% of the population depends on industry and commerce for a livelihood. Grains are grown extensively. The raising of livestock is important. About 56% of Sweden is forest land leading to a flourishing export trade in timber,

lumber, pulpwood, and paper products. The mining industry is notable for the production and export of iron ore and pig iron. Sweden produces steel of excellent quality. Silver, lead, copper, zinc, sulphur pyrites, arsenic and manganese ores are mined. The mechanical, metallurgical, chemical, textile and shipbuilding industries are important to the economy.

COMMUNICATIONS.—Sweden has an extensive system of public roads and railroads. Over 50% of the railroads are electrified. A fleet of modern ships are engaged in international trade. Large ferries ply between Sweden and the continent. An extensive inland waterway system connects ports in central Sweden with the Baltic and North Sea. There is international communication by radio, telephone, and air. Radio facilities, open for public correspondence, are available at Vammo, Karlskrona, Tingstade, Stockholm, Norrköping, Nynashamn, Oskarshamn and Oxelosund.

HOLIDAYS.—The general holidays in Sweden are New Year's Day; Epiphany; Good Friday; Easter Monday; Labor Day; Ascension Day; Whit Monday; Midsummer Day; All Saint's Day; Christmas Days.

STANDARD TIME.—The standard time is of the meridian of 15°E., or one hour in advance of Greenwich mean time.

CURRENCY, WEIGHTS, AND MEASURES.—The monetary unit of Sweden is the krona. The krona is divided into 100 ore. Gold coins do not exist as currency. National bank notes of various denominations are issued as legal tender.

The metric system of weights and measures is compulsory in Sweden.

DERATTING.—On arrival at the first Swedish harbor, an approved Deratting Certificate must be presented to the Customs Officer. The ports of Stockholm, Karlskrona, Oskarshamn, Solvesborg, Kalmar, Karlstad, Karlshamn, Åhus, Norrköping, Nynashamn, Oxelosund, Simrishamn, Slite, Södertälje, Trelleborg, Visby, Västervik, Västeraås, and Ystad issue Deratting Certificates valid for 6 months. Deratting is performed by the Port Health Authority.

DENMARK

1-5 The island of Bornholm (Chapter 2), is the only possession of Denmark described in

this publication. General information on Denmark is given in H.O. Publications 41 and 42.

GERMANY (SOVIET ZONE)

1-6 The eastern part of Germany lies within the Soviet zone of influence. This publication covers only that part of Germany lying eastward of Kap Arkona. The coast from Kap Arkona eastward to Poland is very irregular, fronted by several islands, and backed by numerous lakes. Spits partly separate the lakes from the sea. The entire coastal area is very low and flat. Navigable rivers flow through the plains and empty into the lakes and sea. The coast is bordered by long stretches of sand dunes.

1-7 **GOVERNMENT.**—The government of the Soviet Zone of Germany, hereinafter called East Germany, consists of a People's Chamber of several hundred elected legislators and a Council of State. The Chairman of the council issues decrees with the force of law and interprets existing laws. Members of the council are in charge of various branches of the government. The real power is vested in the Politburo and its First Secretary.

POPULATION.—The population of the Soviet Zone of Germany was about 17,135,000 (1962) in an area comprising about 41,600 square miles. Berlin-Pankow, with over 1,000,000 inhabitants, is the capital.

PORTS.—The only East German ports of significance in this volume are Sassnitz, Wolgast, and Greifswald. The former is a naval base and fishing port.

INDUSTRY AND PRODUCTS.—The Soviet Zone of Germany has an industrial and agricultural economy with industry producing about 65% of the national income. Potatoes, rye, wheat, and sugar beets are grown extensively. The fishing industry is important, with numerous deepwater and coastal vessels engaged. Shipbuilding flourishes with repairs to vessels also providing employment to many people. Metallurgy, and the raising of livestock is important to the economy.

COMMUNICATIONS.—Rugen Radio is open for public correspondence.

HOLIDAYS.—The general holidays are New Year's Day, Good Friday, Easter Monday, Labor Day, Liberation Day, Ascension Day, Whit Monday, Day of the Republic, Reforma-

tion Day, Prayer Day, and Christmas Days. Saturday is an ordinary working day. Labor Day and Day of the Republic are the only general holidays when work cannot be arranged.

STANDARD TIME.—The standard time is of the meridian of 15°E., or one hour in advance of Greenwich mean time.

CURRENCY, WEIGHTS, AND MEASURES.—The monetary unit is the Deutsche Mark-Oste. The mark is divided into 100 pfennigs.

The metric system of weights and measures is used in Germany.

DERATTING.—Deratting Exemption Certificates are issued at Sassnitz and Stralsund.

POLAND

1-8 The coast of Poland is generally regular for most of its 217 miles. Sand dunes and sand hills form this low coast, backed in many places by lakes filled by the numerous streams and rivers flowing to the sea. Inland, the land rises to a plateau with isolated hills seen from the offing. A large bight, where the coast recedes over 30 miles, contains the principal ports of Poland.

1-9 **GOVERNMENT.**—The Polish People's Republic adopted a Constitution in 1952 vesting authority in the Sejm. The Sejm elects a Council of State and a Council of Ministers. Local administration is carried out by People's Councils elected for 3 years.

The supreme power lies in the Politburo of the dominant United Workers' Party. The Politburo is made up of 12 members elected by the Party and headed by a First Secretary.

There is a U. S. Embassy in Warsaw.

POPULATION.—In an area of 120,360 square miles, the population by a census of December, 1960 resulted in a total of 29,775,000. Warsaw, the capital of Poland, had a population in 1965 of 1,250,000.

PORTS.—The principal ports of Poland are Gdansk, Gdynia, and Szczecin. Secondary ports include Kolobrzeg, Darlowo, Swinoujscie, and Ustka.

INDUSTRY AND PRODUCTS.—Poland has changed from an agricultural to an industrial economy since 1940. About 38% of the population is dependent on agriculture for a livelihood. Key industries are under state control and a planned economy exists in all branches of industry. However, most of the agricultural and forest lands are privately owned. The most important farm crops are potatoes, sugar beets, and grains. Tobacco

leaf is grown extensively. The raising of livestock, especially cows and pigs, is important. The fishing industry is huge and highly mechanized. Coal from mines of Poland is exported in enormous quantities. Lignite and railroad rolling stock are among the main exports. Cotton, woollen, and silk fabrics are produced and exported. The shipping and shipbuilding industries are flourishing, especially trade with U.S.S.R.

COMMUNICATIONS.—Radio stations, open for public correspondence, are located at Jaroslawiec, Wladyslawowo, Szczecin, Gdynia and Gdansk.

HOLIDAYS.—The general holidays in Poland are New Year's Day, Easter Monday, Labor Day, Corpus Christi, National Holiday of Poland, All Saints' Day, Patron of Miners, Christmas Eve, Christmas Days. Saturday is a regular working day. Work stops at 3 p.m. on Christmas Eve. Dec. 4 is a holiday only for coal miners and stevedores loading coal. There are no local or half holidays. Work is performed in three 8-hour shifts. The normal work week starts at 10 p.m. on Sunday.

STANDARD TIME.—The standard time is of the meridian of 15°E., or one hour in advance of Greenwich mean time.

CURRENCY, WEIGHTS, AND MEASURES.—The monetary unit of Poland is the zloty, which is divided into 100 groszy. Bank notes of various denominations are issued as legal tender. Numerous coins with less value are also in circulation.

The metric system of weights and measures is used in Poland.

DERATTING.—Ships calling at Polish ports are obligated to have a valid Certificate of Deratting or Deratting Exemption Certificate. The Health Authority of Gdynia, Gdansk, and Szczecin issue Deratting Certificates, valid for 6 months. At Swinoujscie, Deratting Exemption Certificates are issued.

LITHUANIA

1-10 Lithuania, bounded northward by Latvia and southward by part of the U.S.S.R., is generally a low country except in the southeastern and northwestern sections where there are groups of hills. Rivers and their tributaries flow through the valleys between the hills and course the plains emptying into the Baltic. Lithuania has a total area of about 25,170 sq. miles with a sandy seacoast about 50 miles long.

1-11 GOVERNMENT.—Lithuania was incorporated in the U.S.S.R. on 3 August, 1940.

The structure of Government is similar to all Soviet Republics.

POPULATION.—Lithuania had a population (Jan. 1966), of 2,990,000. Vilnius (formerly Vilna) with about 271,000 (1963) inhabitants is the capital and largest city.

PORTS.—Klaipeda, with a population of about 105,000 (1962), is the only important port.

INDUSTRY AND PRODUCTS.—Lithuania, largely agricultural prior to 1940, has since become considerably industrialized. Almost 50% of the working people are engaged in industrial production.

Potatoes, grains, vegetables, and sugar beets constitute the main produce grown. The raising of livestock, especially cows and pigs, is important to the economy. Heavy engineering, shipbuilding, and the building material industries are developing. There are huge peat reserves and low grade coal is exported along with building materials, pig iron, chemicals, and fabrics.

COMMUNICATIONS.—Klaipeda Radio is open for public correspondence.

HOLIDAYS.—The general holidays in Lithuania are New Year's Day, World Labor Days, October Revolution, and Constitution Day. Saturday, and days before holidays are three-fourths working days. Sunday is a holiday. On Monday and days after holidays work starts at 8 a.m.

STANDARD TIME.—The standard time is of the meridian of 45°E., or three hours in advance of Greenwich mean time.

CURRENCY, WEIGHTS, AND MEASURES.—The monetary unit of Lithuania is the ruble. The ruble is divided into 100 kopecks. State Bank notes and Treasury notes in various denominations of rubles are in circulation. Coins valued up to one ruble are on issue.

The metric system of weights and measures is used in Lithuania.

DERATTING.—Deratting of ships is performed by the Health Authority at Klaipeda. Valid Certificates of Deratting are issued and remain in force for six months.

RUSSIAN SOVIET FEDERAL SOCIALIST REPUBLIC (RSFSR)

1-12 Part of this republic fronts on the Baltic. Located between Poland and Lithu-

ania, this area is low and rather flat, with numerous lakes fed by streams flowing to the sea. The largest lakes are separated from the Baltic by a coastline formed of sand dunes. The land is wooded in several places near the coast. A salient feature is a broad outcropping of land forming the north-eastern side of the Gulf of Danzig.

1-13 GOVERNMENT.—This area was formerly part of East Prussia. By decree of 7 April 1946 it became part of the RSFSR. As a region of a socialist republic it is represented in the Supreme Soviet by deputies elected by secret ballot under a system of universal suffrage and according to population. The deputies form a legislative body elected to office for four years.

POPULATION.—In a region estimated to be about 6,600 sq. miles there was a population (1947) of 600,000.

PORTS.—Kaliningrad, with a population (1962) of 232,000 is the principal city and port. Baltiysk, of secondary importance, is a naval port and fishing terminus. There are about 20,000 inhabitants.

INDUSTRY AND PRODUCTS.—This region is largely agricultural but is becoming more industrialized. The terrain is conducive to farming and the raising of livestock. Numerous small harbors provide a haven for a flourishing fishing industry. The lumber industry is important with sawn timber and woodpulp being exported. Wheat, oats, etc. are grown in sufficient quantity to permit grain export.

COMMUNICATIONS.—Kaliningrad Radio is open for public correspondence.

HOLIDAYS.—The general holidays are the same as those observed in Lithuania.

STANDARD TIME.—The standard time is of the meridian of 45°E., or three hours in advance of Greenwich mean time.

CURRENCY, WEIGHTS, AND MEASURES.—See section 1-11.

The metric system of weights and measures has been used since 1927.

DERATTING.—The Health Authority performs deratting services and issues Certificates of Deratting at Kaliningrad.

LATVIA

1-14 Latvia, bounded southward by Lithuania, northward by Estonia and the waters

adjacent including the Gulf of Riga, is a flat and undulating country with a coastline about 200 miles long on the Baltic and Gulf of Riga. The coast is low and sandy, backed in places by thinly wooded hills. Inland, there are forests, lakes and several rivers, at the mouth of which lie the principal ports of Latvia. Peat bogs are common throughout the country.

1-15 GOVERNMENT.—Latvia was incorporated in the U.S.S.R. on 3 August, 1940.

The structure of government is similar to that of Lithuania.

POPULATION.—Latvia, with a total area of 25,590 sq. miles, had a population (Jan. 1966) of 2,300,000. Riga, the capital of Latvia, has about 675,000 inhabitants.

PORTS.—The principal port is Riga. Important Latvian ports on the Baltic are Liepaja and Ventspils.

INDUSTRY AND PRODUCTS.—About 60% of the population is engaged in industry. Latvia is the main producer of electric railroad passenger cars and telephone equipment in the U.S.S.R. It is a large producer of paper and woolen goods, sawn timber, and mineral fertilizers. Cement, leather goods, and fabrics are produced in great quantities.

Cattle breeding and dairy farming are the chief agricultural occupations. Potatoes, oats, barley, rye and flax are the main crops. Over 75% of the farm work has been mechanized. Sheep raising for wool is extensive.

COMMUNICATIONS.—Radio stations at Riga, Ventspils, and Liepaja are open for public correspondence.

HOLIDAYS.—The general holidays are the same as those observed in Lithuania (sec. 1-11).

STANDARD TIME.—The standard time is similar to that observed in Lithuania.

CURRENCY, WEIGHTS, AND MEASURES.—See section 1-11.

The metric system of weights and measures is used throughout Latvia.

DERATTING.—Deratting can be performed at Riga and Deratting Certificates issued, valid for 6 months.

ESTONIA

1-16 Estonia, located northward of Latvia and southward of the Gulf of Finland, is a

low country, about 22% wooded, with many lakes drained by rivers flowing seaward. Estonia has a generally low coast, mostly rocky with occasional sand dunes. The northern coast has limestone cliffs backed by rocky ridges in places. Numerous islands, islets and shoals lie off the coast of Estonia.

1-17 GOVERNMENT.—Estonia was incorporated in the U.S.S.R. on 3 August, 1940. The structure of government is similar to that of Lithuania (sec. 1-11).

POPULATION.—Estonia, with an area of 17,410 sq. miles, had a population of 1,285,000 (Jan. 1966). Tallinn, with about 311,000 inhabitants, is the capital.

PORTS.—Parnu, located in a bight at the northeastern side of the Gulf of Riga, is the only important port of Estonia included in this publication.

INDUSTRY AND PRODUCTS.—Estonia has large deposits of rich oil shale. Mining and refining of the shale has resulted in new towns being built in the areas. Gas, from the millions of tons of shale mined, is piped to Tallinn and Leningrad. Phosphorites are mined and superphosphates are produced resulting in the export of mineral fertilizers. Electric motors and instruments are manufactured. Peat is mined in quantity. Fabrics, leather goods, cement, lumber, are produced.

Agriculture and dairy farming are the principal occupations. Agriculture is highly mechanized. Potatoes and grains are the main crops with butter, milk and eggs produced in quantity.

HOLIDAYS.—The general holidays are the same as those observed in Lithuania (sec. 1-11).

STANDARD TIME.—The standard time is similar to that observed in Lithuania.

CURRENCY, WEIGHTS, AND MEASURES.—See section 1-11. Currency is issued in various denominations of rubles.

The metric system of weights and measures is used in Estonia.

DERATTING.—Deratting is performed and Certificates issued, at Tallinn. However, there are no ports in Estonia within the confines of this publication listed with the World Health Organization.

FISHERIES

1-18 Fishing in the Baltic is less extensive

than in the North Sea. The sea area is not organically rich and is semi-isolated. The eastern Baltic countries have fishing combines, mostly mechanized, and large storage facilities. However, the industry evolves around fish caught mainly outside the Baltic.

Herring, flounder, cod, eels, salmon, Baltic herring, and mackerel make up the Baltic product. Herring is the most important. Fishing, although conducted throughout the year, is chiefly seasonal. All types of nets are used depending on depths, season, and kinds of fish. Trawling is carried on in the deeper waters around Gotland.

Because of the limited types and quantities of fish caught in the Baltic, a large amount of fish is imported. Sweden does export a small quantity of herring.

BUOYAGE

UNIFORM SYSTEM OF MARITIME BUOYAGE

GENERAL

1-19 The International Uniform Systems of Buoyage as agreed at the International Conference at London in 1936 are described below.

There are two uniform systems, the "Lateral" system and the "Cardinal" system. The lateral or side marking system is generally used for well-defined channels. The cardinal or directional system is generally used to indicate dangers where the coast is flanked by numerous islands, rocks, and shoals, as well as to indicate dangers in the open sea. In the latter system the bearing (true) of the mark from the danger is indicated to the nearest cardinal point.

One or both systems may be used in the same country, according to preference or local requirements, on condition that the limits of their respective use are clearly indicated in nautical documents and, if necessary, by means of appropriate marks. Where both systems are used simultaneously, the transition from one system to the other is indicated by transition buoys. In case where there is no doubt as to what system is being used, the transition buoys may carry topmarks.

LATERAL SYSTEM OF MARKING FAIRWAYS AND CHANNELS

1-20 POSITION OF MARKS.—In principle, the position of marks in the lateral system is determined by the general direction taken by the mariner when approaching a harbor, river, estuary, or other waterway from seaward, and may also be determined with reference to the main stream of the flood-tide. The application of the principle shall be defined, as required, by nautical documents.

The term "starboard hand" denotes that side which will be on the right side of the mariner when approaching from seaward and the term "port hand" denotes the left side of the mariner.

SIDES OF CHANNELS.—Starboard hand marks are conical or spar buoys. Conical buoys are black, or, for purposes of differentiation, black and white checkered. Spar buoys are black, or, for purposes of differentiation or visibility, black with the upper part white. The topmark, if any, on a conical buoy is a black cone, point up, or, for the purposes of differentiation but not at a channel entrance, a diamond. A spar buoy may carry a downturned broom as a topmark.

Light buoys show 1 or 3 white flashes or occultations; green lights of a character not allocated to the marking of wrecks; or both white lights and green lights with the above characteristics.

Port hand marks are can or spar buoys. Can buoys are red, or, for purposes of differentiation, red and white checkered. Spar buoys are red. The topmark, if any, on a can buoy is a red cylinder, or, for purposes of differentiation but not at a channel entrance, a red "T". A spar buoy may carry an upturned broom as a topmark.

Light buoys show red lights with any number of flashes or occultations up to four; white lights with 2 or 4 flashes or occultations; or both red lights and white lights with the above characteristics.

Note.—The use of yellow instead of white in the checkered buoys is permitted in secondary channels.

NUMBERING AND LETTERING.—If buoys at the sides of a channel are numbered or lettered, the numbering or lettering shall

begin from seaward, odd numbers on the starboard hand and even numbers on the port hand.

MIDCHANNELS.—Midchannel marks serve to indicate the deepwater channel or fairway. They may be passed on either side, but preferably be left on the port hand.

These marks should, as far as practicable, be distinctive and different from the principal characteristics shapes (conical, can, and spherical). The buoys are black and white, or red and white, vertically striped. The topmark, if any, should be of a distinctive shape other than cone, point up; cylinder; or sphere. Lights, if any, are to be of a character different from the neighboring lights on the buoys at the sides of the channel.

MIDDLE GROUNDS.—Middle grounds are marked on each end by spherical or spar buoys. Bifurcational buoys are at the outer ends of the middle grounds and conjunctional buoys are on the inner ends of the middle grounds.

When the main channel is to the right, both bifurcational and conjunctional buoys are red and white horizontally banded. The topmarks, if any, on the bifurcational buoys are a red cylinder on the spherical buoy and a red cylinder over a red sphere on the spar buoy. The topmarks, if any, on the conjunctional buoys are a red "T" on the spherical buoy and a red "T" over a red sphere on the spar buoy.

When the main channel is to the left, both bifurcational and conjunctional buoys are black and white horizontally banded. The topmarks, if any, on the bifurcational buoys are a black cone, point up, on the spherical buoy and a black cone, point up, over a black sphere on the spar buoy. The topmarks, if any, on the conjunctional buoys are a black diamond on the spherical buoy and a black diamond over a black sphere on the spar buoy.

When the channels are of equal importance, both bifurcational and conjunctional buoys are red and white horizontally banded. The topmarks, if any, on the bifurcational buoys are a red sphere on the spherical buoy and two red spheres, vertically displayed on the spar buoy. The topmarks, if any, on the conjunctional buoys are a red St. George's cross on the spherical buoy and a red St. George's cross over a red sphere on the spar buoy.

Light buoys marking middle grounds will, as far as possible, show lights that are distinctive, and neither color nor rhythm will be such as to lead to uncertainty as to the side on which the buoy should be passed.

CARDINAL SYSTEM OF MARKING DANGERS

1-21 POSITION OF MARKS.—The marks are placed off the danger in one of the four quadrants, north, south, east, or west, relative to the position of the danger. The north quadrant is deemed to lie between northwest and northeast; the south quadrant between the southeast and southwest; the east quadrant between the northeast and southeast; and the west quadrant between the southwest and northwest.

NORTH QUADREANT.—The marker in this quadrant is a black conical or spar buoy with a wide white median band. The topmark, if any, is a black cone, point up. If lighted, it shows a white light with an odd number of flashes (preferably) or occultations.

SOUTH QUADREANT.—The marker in this quadrant is a red can or spar buoy with a wide white median band. The topmark, if any, is a red cone, point down. If lighted, it shows a red (preferably) or white light with an even number of flashes (preferably) or occultations.

EAST QUADREANT.—The marker in this quadrant is an ogival or spar buoy painted red above white. The topmark, if any, is two red cones, bases together. If lighted, it shows a red (preferably) or white light with an odd number of flashes (preferably) or occultations.

WEST QUADREANT.—The marker in this quadrant is a spindle or spar buoy painted black above white. The topmark, if any, is two black cones, points together. If lighted, it shows a white light with an odd number of flashes (preferably) or occultations.

Note.—If desired, the shapes of the markers may be limited to two, the conical shape being used in the northern and eastern quadrants and the cylindrical shape being used in the southern and western quadrants.

When spar buoys only are used, it may be advantageous in the northern and eastern quadrants to reverse the position of the darker colors. In this case, the spar in the northern quadrant would be white with a wide black

median band and the spar buoy in the eastern quadrant would be white above red.

MARKING OF WRECKS

1-22 Wrecks may be marked either in the lateral or cardinal system. Green is the predominant color of the markers and lights. Light vessels and buoys marking wrecks generally have painted on their sides in white the letter "W" and the word "wreck" in the language of the country under whose authority they lie.

LATERAL SYSTEM.—The lateral system is generally used for marking wrecks in the channels.

Markers to be left on the port hand are green can or spar buoys. The topmark, if any, is a green cylinder. If lighted, a group flashing (2) green light is shown.

Markers to be left on the starboard hand are green conical or spar buoys. The topmark, if any, is a green cone, point up. If lighted, a group flashing (3) green light is shown.

Note.—If the marker in the above two instances does not conform to the characteristic shape, the lower part of the marker shall be colored black or red, as the case may be, but the predominant color shall be green.

Markers that may be passed on either side are green spherical or spar buoys. The topmark, if any, is a green sphere. If lighted, a single occulting green light is shown.

Wreck-marking vessels that are to be left on the port hand have green hulls with the above-mentioned inscriptions on both sides. They will display a green cylinder above a green sphere in a position above the superstructure where they are distinctly visible. At night two green fixed lights are carried in lieu of the shapes. During periods of low visibility two strokes of the bell, if used, are rung at intervals of not more than 30 seconds.

Wreck-marking vessels that are to be left on the starboard hand have hulls and inscriptions similar to that described above, but display a green cone, point up, over two green spheres, all vertically shown. At night three green fixed lights are shown in lieu of the shapes. During periods of low visibility three strokes of the bell, if used, are rung at intervals of not more than 30 seconds.

Wreck-marking vessels that may be passed on either side have hulls and inscriptions similar to that described above, but display four green spheres, which are shown vertically in pairs. At night four green fixed lights are shown in lieu of the shapes. During periods of low visibility four strokes of the bell, if used, are rung at intervals of not more than 30 seconds.

Note.—Vessels marking wrecks shall not carry the ordinary riding lights carried by a vessel at anchor.

Should the sound signals be given by means other than a bell, they shall be such as not to be mistaken for neighboring sound signals.

CARDINAL SYSTEM.—The cardinal system is generally used for marking wrecks outside the channels. Wreck marks are placed only in the eastern and western quadrants.

The markers in the eastern quadrant are green conical, ogival, or spar buoys that carry a topmark of two green cones, bases together. If lighted, the marker carries a green interrupted quick flashing light.

The markers in the western quadrant are green cylindrical, spindle, or spar buoys that carry a topmark of two green cones, points together. If lighted, the marker carries a green flashing light.

MISCELLANEOUS MARKERS

1-23 **ISOLATED DANGERS.**—Isolated dangers may be passed on either side. The markers are spherical or spar buoys painted in black and red horizontal bands and separated, if desirable, by a narrow white band. The topmark, if any, is a black sphere, or a red sphere, or a red and black sphere. If lighted, they show a rhythmic red or white light.

LANDFALLS.—Landfall marks serving to indicate the seaward approach to a harbor, river, or estuary are optional in shape and the topmark they carry, but they must not be misleading, having regard to the rules for channel marking. They are either black and white, or red and white, vertically striped. If lighted, they show a rhythmic light.

TRANSITION MARKS.—These marks indicate the change between the cardinal and lateral systems. The shapes and topmarks are optional, but they must not be misleading, having regard to the rules for channel marking. They are painted in red and white, or black and white, spiral bands.

QUARANTINE GROUNDS.— Quarantine ground markers have optional shapes but are yellow in color.

OUTFALLS AND SPOIL GROUNDS.—The shapes of these markers are optional, but the color is yellow above black. Lights are optional, but if carried, due regard should be paid to the character of other lighted marks in the vicinity.

MILITARY PRACTICE AREAS.—The limits of these areas are marked by buoys that have optional shapes. The markers are white with four vertical blue stripes from waterline to top of markers, and which appear as a cross when seen from above. Abbreviated lettering in red indicates in the national language a dangerous area (e. g., in English, "D.A.") appears on the marker.

SWEDEN

GENERAL

1-24 The Governments of Sweden, Norway, Denmark and Finland have agreed to change their systems of buoyage and beaconage in order to approach a more uniform system in Scandinavian waters.

In Swedish waters the change of system will be performed successively during the spring of 1965. The new system is described below.

MARKING OF FAIRWAYS

1-25 In the marking of fairways a combined cardinal and lateral system is being applied, i.e. the marking takes place with regard to the main direction of the fairways, which is either north-south or east-west. The Swedish Board of Shipping and Navigation has designated the main directions of the fairways in Swedish waters. For the directions of fairways within the limits of this publication, see Table 1. When passing through fairways the same types of perches or buoys should always be kept on the same side regardless of occasional deviations of the fairways.

The Main Direction of a fairway will be marked as follows:

On the northern and western side of the fairway: Red perches with one or two red topmarks, consisting of cones, points down. When buoys are used, they are painted red.

On the southern and eastern side of the fairway: Black and white perches, either without topmarks or with one or two black topmarks, consisting of cones, points up. When buoys are used, they are painted black.

On middle grounds, which can be passed on either side: Black and red perches with one or two balls, perches and topmarks being painted in black and red, horizontal bands. When buoys are used the topmarks are painted in black and red, horizontal bands, the buoy in black and red stripes.

Perches with cone topmarks may also be furnished with a ball below the cone, the ball being painted the same color as the cone topmark.

MARKINGS IN THE OPEN SEA

1-26 Shoals in the open sea, seaward of the coastal reefs and marked fairways, are marked in accordance with a cardinal system, i.e. the shape and color of the perches depend on the bearing from the ground. The bearing is indicated to the nearest cardinal point.

North from the ground: White perches with a black band and black cone topmark, point up.

West from the ground: Black and white perches with two black cone topmarks, base to base.

South from the ground: Red perches with one red cone topmark, point down.

East from the ground: White and red perches with two red cone topmarks, point to point.

The middle of a fairway, for instance in a mineswept channel: Black and red perches with one or two ball topmarks, perches and topmarks being painted in black and red horizontal bands.

Perches with cone topmarks may also be furnished with one or two ball topmarks below the cones, the balls being painted with the same color as the cones.

BUOYS in the open sea:

North and west from ground: Black buoys.

South and east from ground: Red buoys.

In the middle of a channel: Black and red buoys, painted in horizontal bands or vertical stripes.

Table 1
DIRECTIONS OF SWEDISH FAIRWAYS

From—	To—	Direction
Sea	Tralleborg	South-north.
Do.	Ystad	Do.
Do.	Simrishamn	East-west.
Do.	Ahus, southern channel	South-north.
Do.	Ahus, northern channel	East-west.
Do.	Solveborg	South-north.
Do.	Ornavik	Do.
Do.	Fukavik	Do.
Eko	Inner channel—sea to Karlshamn	East-west.
Sea	Karlshamn	South-north.
Do.	Tarno, western channel	West-east.
Do.	Tarno, eastern channel	East-west.
Do.	Matvik	South-north.
Do.	Ronneby	Do.
Sea, at Arpo	Channel Aspo-Karlskrona	West-east.
Do.	Karlskrona	South-north.
Sea	Hastholmen	Do.
Do.	Inlangan	Do.
Do.	Ungskar	East-west.
Sea, at Langoren	Karlskrona, inner channel	Do.
Sea	Sandhamn	South-north.
Do.	Kristianopol	East-west.
Do.	Degerhamn	West-east.
Do.	Bergkvara, southern channel	South-north.
Do.	Bergkvara, middle and northern channel	East-west.
Do.	Varnanas	Do.
Do.	Ekenas, southern channel	South-north.
Do.	Ekenas, northern channel	East-west.
Channel, Skaggenas-Grimskar	Farjestaden (Oland)	West-east.
Do.	Kalmar	East-west.
Do.	Drag	South-north.
Sea, at Skaggenas	Sea, south Grimskar	North-south.
Sea	Kareholm	East-west.
Do.	Borgholm	West-east.
Do.	Grankullaviken (Olands Norra Udde)	North-south.
Channel, sea—Monsteras	Channel, sea—Pataholm, west of Norra Manngrund and Pata Enskar	Do.
Sea	Pataholm	East-west.
Do.	Timmernabben	Do.
Do.	Monsteras	Do.
Sea, east of Runo	Channel, Vallo-Paskallavik	North-south.
Sea, at Damman or Vallo	Paskallavik and Emm	South-north.
Sea, north of Runo	Paskallavik and Vanevik	East-west.
Sea	Oskarshamn, southern channel	South-north.
Do.	Oskarshamn, middle and northern channel	East-west.
Do.	Figeholm	South-north.
Sea, at Krakelund	Karrevik	East-west.
Sea, at Ljungska	Helgerum, Slingsviken, and others	Do.
Sea	Varkeback	Do.
Sea, at Ido Stangskar	Channel north of Ido-Vastervik	South-north.
Sea, north of Ido	Vastervik, Gamleby, and Almvik	East-west.
Do.	Vino, Lerboholm, and others	South-north.
Do.	Ed. Helgenas, and others	Do.
Sea, at Storklappen	Loftahammer, Bjorko, Vino	East-west.
Sea, at Boko, south of Orskar	Valdemarsvik	South-north.
Sea, at Boko	Boko	East-west.
Sea, at Haradska	Orrfjarden, Barosund, and Hasko	South-north.
Finnfjard, north of Vaggo	Channel, Arko-Men	Do.
Aspofjord, north of Ormoar	Rimmo, on the channel Arko-Men	East-west.
Sea, at Arko, southern entrance	Men and others	Do.
Do.	Norrkoping and others	Do.
Sea, at Arko, north entrance	Channel, Femorehuvud-Krakelund	Do.
Femorehuvud	Krakelund	North-south.
Sea, at Hafringe	Norrkoping and others	East-west.
Do.	Oxelösunds Hamn (Brevik)	Do.
Do.	Nykoping	South-north.
Sea, at Hafringe, north of Lillhammarsgrund	Alofjarden	South-north.
Sea, at Enskar	Channel, Savosund-Oxelösund	Do.
Harkholmar, on channel Landsort-Sodertelje	Femorehuvud and Norrkoping, through Savosund and Oxelösund	East-west.
Sea, at Landsort	do	Do.
Do.	Sodertelje	South-north.
Viksten	Channel, Viksten-Savosund, west of Landsort	Do.
Sea, at Landsort	Savosund, via Herrhamra	East-west.
Do.	Herrhamra, east of Landsort	South-north.
Do.	Gustavsberg	Do.
Sea, at Huvudskar	Kanholmen or through Vindostrom to Kalvo	Do.
Do.	Gustavsberg	Do.
Do.	Kanholmen or through Vindostrom to Kalvo	Do.
Sea, at Sandhamn	Stockholm	East-west.
Furusund	Kanholms Fjard (Husaro channel)	North-south.
Sea, at Soderarm	Stockholm (Furusunds channel)	East-west.
Tjocko	Norttelje	Do.
Sea, at Arholma, Hogska, or Vedlosa	Kapellska	North-south.

GOTLAND

Sea.....	Burgsvik.....	West-east.
Do.....	Klintehamn.....	Do.
Do.....	Vastergarn.....	Do.
Sea, south of Vastergarn.....	Sea, north of Vastergarn.....	South-north.
Sea.....	Viaby.....	West-east.
Do.....	Kappelshamn.....	North-south.
Do.....	Farosund, northern entrance.....	Do.
Do.....	Stockviken.....	South-north.
Do.....	Ronehamn, southern channel.....	Do.
Do.....	Ronehamn, northern channel.....	East-west.
Do.....	Ljugarn.....	Do.
Sea, north of Ostergarn.....	Sea, south of Ostergarn.....	North-south.
Sea.....	Katthammarvik.....	Do.
Do.....	Slitehamn.....	South-north.
Do.....	Kyllej.....	Do.
Do.....	Farosund, southern entrance.....	Do.

MARKING OF WRECKS

1-27 Wrecks are marked by lighted buoys, buoys with staffs, or wreck-marking vessels.

Wreck buoys are painted green. Lighted wreck buoys are anchored northeastward of the wreck and show two green flashes; those anchored southwestward, one green flash. Unlighted wreck buoys, anchored northeastward and southwestward of wrecks, display on a staff two green flags and one green flag, respectively. The buoys are moored as close to the wrecks as possible for safety. Ships should pass northeastward or southwestward of the wreck buoys, as indicated.

Wreck-marking vessels can be either lightships or other vessels fitted as such, with the hulls painted some color other than red, if possible. A wreck-marking vessel shall show:

BY DAY.—Three green balls displayed from a yardarm, one ball at the end of the arm nearest the wreck and two balls, vertical, from the opposite arm.

AT NIGHT.—Three green fixed lights similarly arranged, but no anchor light is shown.

In fog, a bell is sounded for about 10 seconds at intervals of not more than two minutes. A wreck-marking vessel anchored northeastward of the wreck sounds repeated double strokes on the bell at short intervals. A similar vessel anchored southwestward of the wreck sounds a series of single strokes on the bell at short intervals. Ships should pass northeastward and southwestward, respectively, of these vessels. If a ship is observed to be on a collision course toward the wreck, warning shots will be fired from the wreck-marking vessel, if possible.

1-28 LIGHTSHIPS.—Swedish lightships have the hull and superstructure painted red with the name of the lightship painted in large, white letters on each side of the hull. By day, the lightships carry red skeleton balls, the number of balls hoisted corresponding to the number of lights shown at night. These daymarks are struck if the lightship is driven from station. If a lightship is temporarily replaced on station by a reserve lightship, it also will be painted red with "Reserv" in white letters on each side of the hull.

Warning shots are fired on the lightship at short intervals when a ship is seen standing into danger.

MISCELLANEOUS MARKERS

1-29 QUARANTINE.—Quarantine ground markers may have optional shapes, are yellow in color and are layed out when necessary.

OUTFALLS AND SPOIL GROUNDS.—The shapes and lights are optional but the color of the markers is usually yellow above black.

ANCHORAGE.—Anchorage markers have optional shapes and are white in color.

MILITARY PRACTICE AREAS.—See sec. 1-23.

RADAR REFLECTORS AND REFLECTORS.—Many buoys in Swedish waters have radar reflectors; many more have reflectors. This is also true for fixed aids such as beacons. The radar reflectors are yellow cylinders, about 3 feet in length and 5 inches in diameter, fixed vertically atop the buoys. If topmarks are carried the cylinders surmount the topmark.

Reflectors mounted on buoys give good reflection when in the beam of a searchlight. Red buoys and black buoys carry red reflectors and white reflectors, respectively.

CABLES AND BEACONS.—Submarine cable landings are marked by beacons or notice boards, the latter painted yellow with black lettering. If buoys are used they are painted red and white with the word "Kabel" in black. Beacons and boards marking power cables carry the warning "Kabel" and "Ankring Forbudt".

In channels and frequented waters the line of the cable is indicated by two beacons or poles in range. The front beacon or pole has a red circular board with white edges as a topmark. The rear beacon has the same circular topmark and a white diamond-shaped marker with red edges below it. In range these marks appear as a white diamond between two red circles. At night, if lighted, these marks show a red light from each circle and a white light from the diamond.

Beacons consist of towers, fixed perches, poles, stakes, and cairns. They may have boards fixed with stays and various topmarks. Some beacons are lighted. Cairns are built of stone or concrete, usually conical in shape. The fixed perches and poles often mark above- and below-water shoals.

1-30 CAUTION.—In winter, floating aids to navigation could be damaged, drift, or be lost. Weather conditions may also necessitate their withdrawal from station. At the beginning of winter many lightships and lighted buoys are replaced by small buoys more capable of resisting damage or loss. Topmarks and radar reflectors on remaining buoys are removed.

Red reflectors may bleach causing a yellow reflection. Care should be exercised not to confuse these with white reflectors.

DENMARK

GENERAL

1-31 See section 1-24. The Danish buoyage system is described in H.O. Publications 41 and 42.

GERMANY (SOVIET ZONE)

GENERAL

1-32 The uniform system of buoyage used in East German waters is similar, with some exceptions, to the International Uniform Systems of Buoyage. This modified system went into effect in 1952.

EXCEPTIONS IN THE LATERAL SYSTEM

1-33 MARKING OF FAIRWAYS.—At the entrance of a channel and at the end of a "reach" where course changes occur, the starboard hand can buoys will always carry a black conical topmark, point up. Port hand spar buoys will carry a red cylindrical topmark.

At the inner end of a channel the starboard hand buoys will carry a black diamond topmark and the port hand buoys will carry a red "T" topmark.

The color and characteristics of the lights on the markers of the lateral system do not conform entirely with that of the International Uniform Systems of Buoyage.

CARDINAL SYSTEM OF MARKING DANGERS

1-34 POSITION OF MARKS.—See section 1-21. The markers are inscribed with the names of the dangers, either in full or abbreviated, and with the letters "N", "S", "O", or "W", according to the direction in which they lie in relation to the danger.

NORTH QUADRANT.—The marker in this quadrant is black with a white, horizontal band and carries a topmark of two black cones, points up. If lighted, it shows a white light with an odd number of flashes or occultations.

SOUTH QUADRANT.—The marker in this quadrant is red with a white horizontal band and carries a topmark of two red cones, points down. If lighted, it shows an even number of red flashes or occultations. A quick flashing red light may be shown.

EAST AND WEST QUADRANTS.—The markers in these quadrants conform to those in the International Systems.

MARKING OF WRECKS

1-35 See section 1-22.

EXCEPTIONS IN THE LATERAL AND CARDINAL SYSTEMS

1-36 In the lateral system of marking wrecks the lights on the markers are green, but the characteristics are not the same as those given in the International Systems of Buoyage.

In the cardinal system the wreck markers are placed in four quadrants instead of the two quadrants described in the International Uniform Systems of Buoyage. Green spar or beacon buoys with green topmarks are used. The topmark of the north quadrant marker consists of two green cones, points up. The topmark of the south quadrant marker consists of two green cones, points down. The topmark of the east quadrant marker consists of two green cones, bases together. The topmark of the west quadrant markers consists of two green cones, points together. When the marker is placed over the wreck, the topmark that is carried is a green sphere; this topmark may also be shown from the wreck itself. Only the east and west quadrant markers carry green lights, but the characteristics are not the same as those in the International Systems of Buoyage.

MISCELLANEOUS MARKERS

1-37 **TRANSITION MARKERS.**—The markers indicate changes between the cardinal and lateral systems. The shapes and topmarks are optional and are painted in red and white, or black and white spiral bands.

QUARANTINE GROUNDS.—The markers have optional shapes, painted yellow.

PROHIBITED AREAS.—The markers have optional shapes, painted white with a blue stripe.

AMMUNITION DUMPING GROUNDS.—The markers have optional shapes, painted white.

SUBMARINE CABLES.—The area markers are spherical or optional, painted black with the letter "K" in white.

EXPLOSIVES ANCHORAGE.—The area markers are painted yellow with the letter "P" in black.

ROADSTEAD LIMITS.—The marker is painted red, may carry a red cylindrical topmark and is moored on the left side of the adjacent channel. A black marker, with

or without a black conical topmark, point up, is moored on the right side of the adjacent channel.

MEASURED DISTANCES.—The markers are painted in black and white horizontal bands with topmarks consisting of one or more black slanting crosses.

COMPASS ADJUSTMENT.—The markers have optional shapes and are painted in black and white alternate quarters.

MOORINGS.—Mooring markers are painted in red and white alternate quarters.

SPOIL GROUNDS.—The markers have optional shapes with the upper part painted yellow and the lower part black.

FISHING AREAS.—The markers have optional shapes, painted blue, with or without a yellow fish topmark. Spar buoys are used at times.

1-38 **CAUTION.**—See section 1-30.

POLAND

GENERAL

1-39 An adaptation of the International Systems of Buoyage has been used in Polish waters since 1947. The lateral system is employed to mark fairways and channels. The cardinal system is used to mark coastal shoals, reefs and isolated dangers. Both systems may be used simultaneously, depending on local conditions. See section 1-19.

LATERAL SYSTEM OF MARKING FAIRWAYS

1-40 **POSITION OF MARKS.**—See section 1-20. The sides of channels, midchannels, and middle grounds are marked as in the International Uniform Systems of Buoyage (sec. 1-20).

CARDINAL SYSTEM OF MARKING DANGERS

1-41 **POSITION OF MARKS.**—See section 1-21.

NORTH QUADRANT.—The marker is a black conical or spar buoy with a wide, white median band. The topmark consists of two cones, points up. Spar buoys may be white with a black band. The light shown, if any, is quick flashing white or white with an odd number of flashes or occultations.

SOUTH QUADRANT.—The marker is a red can or spar buoy with a wide, white median band. The topmark consists of two cones, points down. The light shown, if any, is red with an even number of flashes or occultations.

EAST QUADRANT.—The marker is a conical, ogival, or spar buoy. The first two have the upper half painted red, the lower half, white. The spar has the upper half white, lower half red. Topmark, two red cones, base to base. The light shown, if any, is quick flashing red or red with an odd number of flashes or occultations.

WEST QUADRANT.—The marker is a can, spindle, or spar buoy, the upper half painted black, lower half white. The topmark consists of two black cones, point to point. The light shown, if any, is white with an even number of flashes or occultations.

MARKING OF WRECKS

1-42 Wrecks may be marked either in the lateral or cardinal system. The marking of wrecks in Polish waters conforms to the International Systems of Buoyage. See section 1-22.

MISCELLANEOUS MARKERS

1-43 ISOLATED DANGERS.—See section 1-23.

LANDFALLS.—See section 1-23. The approach markers carry an "X" topmark, two superimposed "X's", or a simple cross.

TRANSITION MARKS.—The passing from one system to the other is indicated by optional markers, painted in red and white or black and white diagonal stripes. The topmarks consist of a staff with two horizontal bars; painted red or black. Where no confusion exists, these topmarks are added to markers belonging to either the lateral or cardinal system.

QUARANTINE GROUNDS.—The markers are optional in shape and painted yellow.

OUTFALLS AND SPOIL GROUNDS.—The markers are optional in shape with the upper half painted yellow, lower half black. If a light is shown it must differ from other lighted markers in the vicinity.

MILITARY PRACTICE AREAS.—See section 1-23. The marker may bear the letters "S.A." signifying Danger Zone.

U. S. S. R.

GENERAL

1-44 In 1947 the U. S. S. R. adopted a new, uniform system of buoyage based on the systems of various other countries and on the proposals of the International Hydrographic Bureau. The markers of the old system could be found until transition is completed.

The U. S. S. R. buoyage system is in effect in the Russian Soviet Federated Socialist Republic (sec. 1-12), and the waters of Lithuania, Latvia, and Estonia.

The lateral system is used to mark channels and fairways. The cardinal system is used to mark off-lying dangers, coastal shoals and reefs, spoil grounds, fishing grounds, prohibited, mined, and military practice areas.

Topmarks on markers are uniform in shape whereas the shape of the markers may differ. Brooms may replace cones as topmarks.

LATERAL SYSTEM OF MARKING FAIRWAYS AND CHANNELS

1-45 Position of marks.—See section 1-20.

SIDES OF CHANNELS.—Starboard hand marks are conical, spar, and lighted buoys moored on the right side of the channel. The conical buoy is black. The spar buoy is black with a black conical topmark, point up. The lighted buoy is black with a white, odd number.

Port hand marks are conical, spar, and lighted buoys moored on the left side of the channel. These markers are painted red, with the spar buoy having a black conical topmark, point down. The lighted buoy is marked with a white even number.

TURNING MARKERS.—Buoys mark a bend in the channel. Starboard and port hand turning buoys are to be kept on the right and left sides of the channel, respectively, when entering.

The starboard hand marks are conical, spar, and lighted buoys. They are painted black, with a wide, white median band. The spar buoy carries a black conical topmark, point up. The lighted buoy has an odd number and is painted black.

The port hand marks are conical, spar, and lighted buoys. They are painted red, with a wide, white median band. The spar

buoy carries a black conical topmark, point down. The lighted buoy has an even number and is painted red.

MIDCHANNELS.—Buoys are moored in special cases to indicate the deepwater channel or fairway. The marks, which may be passed on either side, are conical, spar, and lighted. The spar buoy is painted in black and white bands and has a black ball topmark. The other markers are similarly painted with the lighted buoy having a white superstructure from which a white light flashes. The buoy may carry an even number, black.

MIDCHANNEL TURNING MARKERS.—Buoys are moored in special cases to indicate the turning positions in the axis of a fairway. The marks are conical, spar, and lighted. They are painted in red and white bands, with the spar buoy surmounted by a red ball topmark. The lighted buoy has a white superstructure, may carry a red, odd number, and shows a flashing red light. When spar buoys are substituted for lighted buoys they carry a topmark of two red balls.

BIFURCATIONAL AND CONJUNCTIONAL BUOYS.—These buoys mark the division of one channel or the junction of two channels and may be passed on either side. The marks are spar, conical, and lighted. The spar buoy is painted in black and red bands with a ball topmark, the upper half black and lower half red. The conical buoy is painted in black and red vertical stripes. The lighted buoy is painted as the conical, with the upper and lower part of the superstructure painted red and the middle, black. A flashing amber light is shown.

ISOLATED DANGERS IN CHANNELS.—These dangers are marked by cross buoys, as described in the cardinal system. If lighted, the period of light is 1 1/2 seconds.

MARKING OF WRECKS.—Wreck buoys are moored close to the wreck they mark. The actual position with reference to the wreck is published in U. S. S. R. Notices to Mariners. Green is the predominant color of the markers and lights. The spar buoys carry a green ball topmark; the lighted buoys show a flashing green light.

THE CARDINAL SYSTEM OF MARKING NATURAL DANGERS

1-46 POSITION OF MARKS.—The North Buoy marks the southern side of the danger, and is left to the northward when passing. The spar buoy is painted red with a red conical topmark, point down. The conical and lighted buoys are painted red, the latter showing a flashing red light.

The South Buoy marks the northern side of the danger, and is left to the southward when passing. The spar buoy is painted white with a black conical topmark, point up. The conical and lighted buoys are painted white, the latter showing a flashing white light.

The East Buoy marks the western side of the danger, and is left to the eastward when passing. The spar buoy is painted white with the upper part black surmounted by two conical black topmarks, base to base. The conical and lighted buoys have black and white vertical stripes, the latter having its lower superstructure painted white, upper part black. A flashing white light is shown or a group flashing white light.

The West Buoy marks the eastern side of the danger, and is left to the westward when passing. The spar buoy is painted red and white with two red conical topmarks, points together. The conical and lighted buoys have red and white vertical stripes, the latter having its lower superstructure painted red, upper part white. A flashing red light is shown or a group flashing red light.

Cross Buoys mark the center of dangers and may be passed on all sides. The spar buoy is painted in red and white bands with a white cross topmark over a red ball. The conical buoy is red with a narrow white median band and four white stripes, forming four white crosses. The lighted buoy is red with the superstructure painted in red and white alternate bands. The median red band has a white cross. A flashing amber light is shown on the buoy.

MISCELLANEOUS MARKERS

1-47 SPOIL GROUNDS.—These grounds are marked in the cardinal system by spar buoys, each buoy having a black crosspiece below the flag, as follows:

North Spar Buoy marks the southern side of the spoil ground and is left to the northward when passing. The spar is painted red;

the flag is triangular with the upper part white and lower part red.

South Spar Buoy marks the northern side of the spoil ground and is left to the southward when passing. The spar is painted white; the flag is triangular with the upper part white and lower part black.

East Spar Buoy marks the western side of the spoil ground and is left to the eastward. The upper part of the spar is black, lower part white. The flag is square, white over black diagonally.

West Spar Buoy marks the eastern side of the spoil ground and is left to the westward. The upper part of the spar is white, lower part red. The flag is square and black.

QUARANTINE GROUNDS AND ANCHORAGES.—Spar buoys, lighted and unlighted buoys mark these areas.

Quarantine Grounds have optional shapes but are yellow in color. The spar buoy has a yellow flag topmark; the lighted buoy shows a flashing orange light.

Quarantine Anchorages are marked by yellow spars with a square yellow flag. Conical buoys are painted yellow. Lighted buoys are painted yellow and show a flashing orange light. Mooring buoys, if tun-shaped, are red with a yellow band around the bilge. Can-shaped mooring buoys do not differ from ordinary mooring buoys.

FISHING GROUNDS.—These grounds are marked in the cardinal system by spar buoys with topmarks, as follows:

North Spar Buoy marks the southern side of the fishing ground and is left to the northward. The spar is red and has a red cone topmark, point down.

South Spar Buoy marks the northern side of the fishing ground and is left to the southward. The spar is white and has a black cone topmark, point up.

East Spar Buoy marks the western side of the fishing ground and is left to the eastward. The spar has a black upper part and white lower part, with two black cone topmarks, base to base.

West Spar Buoy marks the eastern side of the fishing ground and is left to the westward. The spar has a white upper part and red lower part, with two red cone topmarks, points together.

MEASURED DISTANCES.—Spar buoys, lighted and unlighted buoys mark the intersections of the running and transverse transits. The spar buoy is painted white with a narrow, median band and has a blue cross-piece between two blue balls as a topmark. The conical and lighted buoys are painted in blue and white stripes. The lighted buoy has a superstructure painted white with the middle part blue. A flashing blue light is shown from the buoy.

SUBMARINE CABLES.—The cables are marked by spar buoys, lighted and unlighted buoys. The spar is painted in black and yellow bands with a black burgee topmark. The other buoys are painted in black and yellow stripes. The lighted buoy has a black superstructure with the middle part yellow. A flashing orange light is shown from the buoy.

MILITARY PRACTICE AND PROHIBITED AREAS.—These areas are marked in the cardinal system by spar buoys with flags. If a prohibited area is marked by lighted or unlighted buoys, such buoys will conform to the rules for marking natural dangers, but the appropriate spar buoy will always be moored alongside.

North Spar Buoy marks the southern side of the area and is left to the northward. The spar is red with a narrow, white band and carries a triangular red flag.

South Spar Buoy marks the northern side of the area and is left to the southward. The spar is white with a narrow, red band and carries a triangular black flag.

East Spar Buoy marks the western side of the area and is left to the eastward. The upper part of the spar is black, lower part white with a narrow red band. The flag is square and black.

West Spar Buoy marks the eastern side of the area and is left to the westward. The upper part of the spar is white, lower part red with a narrow, white band. The flag is square and red.

MINED AREAS

1-48 MINED AREA MARKERS.—The cardinal system is used in marking dangerous mined areas and to mark individual minefields. The same system is used to indicate mineswept fairways where such fair-

ways lie offshore, and where several fairways trend in different directions.

Spar buoys, unlighted and lighted buoys are used. The spar buoys all have a yellow cross-piece below the flag topmark. The colors of the buoys vary but the middle part of the superstructure on all lighted buoys is painted yellow.

The lateral system is used to mark swept fairways, considered free of mines, in areas that are dangerous because of mines. Spar buoys, unlighted and lighted buoys are used. Starboard hand buoys, marking the right side of the channel from seaward, are black and yellow markers, have white lights and odd numbers. Port hand buoys are red and yellow markers, have red lights and even numbers.

SIGNALS

SWEDEN

1-49 STORM SIGNALS.—Visual storm signals have been discontinued along the Swedish coast. Bulletin boards located at many of the ports and harbors carry storm signals. Weather reports and storm warnings are transmitted daily by the coastal radio stations. See H.O. Pub. 118A, Radio Weather Aids.

1-50 ICEBREAKERS.—The Swedish Government maintains icebreakers to assist in

the navigation of Swedish waters when ice conditions prevail. Municipally-owned icebreakers assist in keeping their harbors and approaches open to navigation.

Swedish icebreakers, by day, display while underway the first repeater pennant of the International Code of Signals. At night, a blue all-round light is shown from the mast-head. On combined Swedish-Danish icebreaking operations a quadricolored pennant is displayed by day and a violet all-round light is shown at night.

Ships requiring assistance from an icebreaker shall, at night, show two vertical red lights; by day, two vertical black balls.

Airplanes may be used to assist the ice-breaking service. They are distinguished by three yellow crowns, on a blue background, lying within a yellow circle painted on the wings of the plane. Ships requiring assistance will display her largest national ensign, her name and port of registry on the ships sides or on deck in letters at least 20 inches high, where best seen from overhead. The ship will signal her port of destination, and if a distress signal is made by the ship, the nature of distress should be indicated to the airplane which will fire a white flare if the signal is understood. The ship will keep radio watch on 500 kc.

Table 2

INTERNATIONAL ICEBREAKER SIGNALS

BY ICEBREAKER		BY ASSISTED VESSEL
G — — .	I am going ahead; follow me.	I am going ahead; I am following you
A . —	Go ahead (proceed along the ice channel)	I am going ahead (I am proceeding along the ice channel).
J . — — —	Do not follow me (proceed along the ice channel).	I will not follow you (I will proceed along the ice channel).
Q — — . —	Shorten the distance between vessels.	I am shortening the distance.
B — . . .	Increase the distance between vessels.	I am increasing the distance.
P . — — .	Slow down.	I am slowing down.
N — .	Stop your engines.	I am stopping my engines.
H	Reverse your engines.	I am reversing my engines.
L . — . .	You should stop your vessel instantly.	I am stopping my vessel.
4 —	Stop. I am ice-bound.	Stop. I am ice-bound.
5	Attention.	Attention.
Y — . — —	Be ready to take (or cast off) the tow line.	I am ready to take (or cast off) the tow line.

INTERNATIONAL ICEBREAKER SIGNALS.—The signals listed have been drawn up by the Intergovernmental Maritime Consultative Organization, and are used by the icebreakers of Norway, Sweden, Denmark, Finland, the Federal Republic of Germany, the Soviet Zone of Germany, Poland, and the U. S. S. R.

Icebreakers of Norway, Sweden, Denmark and Finland use the following signals only: A, P, N, H, 5, and Y.

These single-letter signals, when made between an icebreaker and assisted vessels have only the significations given in this table and are only to be made by sound, visual signals or radiotelephone.

The use of these single-letter signals is introduced and finished respectively by one of the following two-letter groups:—

WM Icebreaker support is now commencing. Use special icebreaker support signals and set continuous watch for sound, visual and radiotelephone signals.

WO Icebreaker support is complete. Proceed to your destination.

The Signal K (— . —) by sound or light may be used by an icebreaker to remind ships of their obligation to listen continuously on their radio.

If more than one vessel is assisted, the distances between vessels should be as constant as possible; watch speed of your own vessel and that of the vessel ahead. Should speed of your own vessel go down, give "Attention" signal to the vessel following.

The use of Table 2 does not relieve Masters of the duty of complying with Rules 15 and 28 of the International Regulations for Preventing Collisions at Sea.

The signal . . — . . by sound and/or light may be used by an icebreaker only to stop the headway of a ship in an ice channel ahead of and approaching, or going away from the icebreaker. This signal when given by a ship to a U.S.S.R. icebreaker, means "I have ceased going ahead".

Finnish and Swedish icebreakers do not make the signals by radiotelephone.

The below single-letter signals, when made by sound, may only be made in compliance with the requirements of the International Regulations for Preventing Collisions at Sea.

Vessels to whom assistance can be given will be given details by the Ice Service, which may entail routing to a different port. The icebreaker should be contacted by radio direct, or through the nearest coast radio station; its instructions should be carefully followed. Vessels considered unsuitable for ice navigation will be advised not to continue their voyage.

The International icebreaker signals are used. Icebreakers are equipped with both bass and tenor sirens. Signals made by tenor siren apply only to the ship nearest to the icebreaker. Signals made by bass siren apply to all ships being assisted, and may also be made by a light synchronised with the siren; these signals should be repeated, in sequence, by all ships.

Any vessel requiring icebreaker assistance gives notice of this by day by hoisting two black spheres, disposed vertically, and at night by hoisting two red lights similarly disposed.

If several icebreakers are working together, the Master of the one with the most powerful engines is to be considered the leader, and, unless other arrangements are made by the harbourmaster, his instructions are to be carried out by the other icebreakers.

1-51 ICEBREAKER ASSISTANCE.—Ships arriving at the edge of ice and requiring assistance should, if possible, await the icebreaker in open water. When following, the assisted vessel should stay to leeward and as close astern of the icebreaker as safety permits, ready to be taken in tow. Assisted ships must quickly follow the directions given by the icebreaker, even if such service has not been requested. The following rules must be observed:

Be ready to put the engines full astern at any moment.

Single-letter signals which may be used during icebreaking operations:

E	.	I am altering my course to starboard.
I	..	I am altering my course to port.
S	...	My engines are going astern.
M	— —	My vessel is stopped and making no way through the water.

Unless otherwise directed, do not overtake and pass any other ship following astern of the icebreaker.

Vessels being towed may not use their propellers unless ordered to do so by the icebreaker. The towing hawser must be secured in such a manner that it can be slipped instantly. A man should stand by the hawser continuously, ready to cast off or cut the hawser if an emergency arises.

Accidents and damage affecting the continued voyage of a ship must be reported to the icebreaker immediately.

1-52 ICE REPORTING.—Swedish icebreakers engaged in icebreaking broadcast their positions each day, their proposed area of icebreaking and rendering assistance in the ensuing 24 hours, and information of local interest to mariners.

There are numerous icebreaker agents located in the larger harbors along the Swedish coast. Ice reports are available to these agents and are read over the radio each morning following the weather report. Coastal radio stations transmit ice conditions several times a day in the Baltic Ice Code, described in H.O. Pub. 117A.

Ships navigating along the Swedish coast and offshore waters during the ice season should, when approaching ice waters, communicate their positions to the coastal radio stations and national icebreakers.

1-53 LIGHTSHIP SIGNALS.—Danger signals are made from some Swedish lightships if a vessel is observed standing into danger. A gun may be fired, the Morse letter "U" may be made by siren or flashing light, or the International Code flag "U" is displayed.

Lightships out of position discontinue their characteristic lights and fog signals. If possible, they will lower their daymarks and make the following signals:

By day, two black balls, one forward and one aft. Red flags may be substituted, if the balls constitute the normal daymark. The International Code Signal "PC".

At night, two red lights, one forward and one aft. Also two flare-up lights, one white and one red shown simultaneously every 15 minutes. If the flare-ups are not available, a red and a white light will be shown. See H.O. Pub. 116, List of Lights.

1-54 DREDGE SIGNALS.—Dredges and salvage vessels should be passed with caution and at slow speeds. They shall exhibit the following signals in addition to signals required by the International Rules of the Road:

By day, a black diamond displayed on the side to be passed.

At night, two green lights shown about 6 feet apart, vertical.

By day, a black ball displayed on the side not to be passed.

At night, two red lights shown about 6 feet apart, vertical.

Passing or non-passing signals may be exhibited on both sides of the dredge if required by circumstances.

During poor visibility, and in addition to the prescribed anchorage signals, a dredge on salvage vessel shall sound on the bell:

A series of single strokes indicating inbound ships shall pass the dredge on their port side as they would a red channel buoy. Outbound ships pass the dredge on their starboard side.

A series of double strokes on the bell indicating inbound ships shall pass the dredge on their starboard side as they would a black channel buoy. Outbound ships pass the dredge on their port side.

When a diver is working, a red and blue diagonally-colored flag is displayed.

1-55 MINESWEEPER SIGNALS.—Swedish naval ships or craft engaged in minesweeping or towing sweeping gear, will make the following signals:

By day, minesweepers will display a black ball at the head of the foremast, and a similar ball at the yardarm on the side or sides on which the sweeping gear is towed.

At night, green lights shown in a manner similar to the balls.

By day, minesweepers towing but not using sweeping gear, will display the International Code flag "D" at the head of the foremast.

At night, three all-round lights, vertical, are shown at the foremasthead. The upper light is red, the middle white, and the lower green.

Ships engaged in acoustic minesweeping will signal Morse code letter "U", indicating approaching vessels must keep at least 1 1/2 miles distant.

When towing or deactivating mines the minesweeper will show an all-round red light or display a red flag atop the foremast.

Vessels engaged in minesweeping should not be closed within 1/4 mile, and ships are not to cross their courses within 1/2 mile. Under no circumstances is a ship to pass through a formation of minesweepers, or between the minesweeper and the buoy vessel astern.

Ships on trial runs for the purpose of making safety arrangements against magnetic mines, will make similar signals to those vessels towing but not using sweeping gear. These ships are not to be closed within 50 yards.

1-56 SPEED SIGNALS.—Ships passing through mined waters close astern of naval ships, or leading ships with the pilot aboard, shall comply with the following semaphore and sound signals made by flag or whistle:

By day, **PROCEED**, flag extended horizontally; **STOP**, flag extended overhead and swung to both sides; **REVERSE**, flag extended vertically downward.

At night or in fog, **PROCEED**, the Morse code letter "C"; **STOP**, the letter "H"; **REVERSE**, the letter "S". The received signal should be repeated by the following ship.

A red ball displayed in the rigging of a vessel lying at a light station indicates that passing ships must not proceed at a speed greater than 5 knots at 200 yards off the moored vessel.

Local speed restrictions are in force within harbors and channels, especially in the Swedish archipelago.

1-57 FIRING PRACTICE—NAVAL MANEUVERS.—Firing from permanent or temporary military ranges on the Swedish coast occurs at various announced times. The danger areas described in the coastal features are sometimes charted and buoyed. Naval patrol vessels display a red flag at the masthead by day, and show a red light at night while in the firing area. Target ships and ships on maneuvers carry the same signals. Ships in transit should avoid or clear the area promptly.

PILOTAGE SIGNALS.—See section 1-104.

SUBMARINE SIGNALS.—See section 1-95.

QUARANTINE SIGNALS.—See section 1-100.

CUSTOMS SIGNALS.—See section 1-101.

GERMANY (SOVIET ZONE)

1-58 STORM SIGNALS.—Visual storm signals are displayed and shown at various places on the East German coast. Their locations are given with related features described in Chapter 7. Storm warnings are broadcast by radio in German and English from Rugen. See H.O. Pub. 118 A (Radio Weather Aids). Storm signals are as follows:

Two black cones, points up, or a red light over a white light indicates a northeasterly storm.

Two black cones, points down, or a white light over a red light indicates a southeasterly storm.

One black cone, point down, or two white lights indicates a southwesterly storm.

One black cone, point up, or two red lights indicates a northwesterly storm.

One red flag displayed with any of the day signals signifies a veering wind, clockwise.

Two red flags displayed with any of the day signals signifies a backing wind, counter-clockwise.

A black ball, or a white light over a green light, indicates a freshening of the wind to force 6 or 7, Beaufort.

All day and night storm signals are disposed vertically.

1-59 ICEBREAKERS.—Icebreakers are available to vessels in East German waters requiring assistance due to ice conditions. Two red lights, vertical, are shown at night by the ship in need of an icebreaker. Icebreakers display a black cylinder by day and a red light at night, both on the foremasthead.

SIGNALS.—Icebreaker Signals for Germany are described in section 1-50.

1-60 ICEBREAKER ASSISTANCE.—See section 1-51.

1-61 ICE REPORTING.—Ice reports are read in plain English every day of the ice season over Rugen Radio. Detailed ice reports covering the harbors, coastal and off-lying waters of East Germany, are transmitted daily in the Baltic Ice Code by Rugen Radio. See H.O. Pubs 117A, 118A. Icebreakers report their positions several times each day.

1-62 DREDGE SIGNALS.—Dredges and salvage vessels should be passed with caution and at slow speeds. The following signals are made by dredges working in channels or other navigable waters:

By day, a red ball visible all around on the side they are to be passed.

At night, a red light above a white light, on the side they are to be passed.

The above signals hoisted on both sides of the dredge indicates passage only on the right side of the passing vessel.

By day, two cones, points together, signifies the dredge is working in and blocking the channel. Passage is prohibited on the side where the signal is hoisted.

At night, a red light over a green light, visible all around the horizon, signifies passage is prohibited on the side of signal hoist.

In fog, a rapid ringing of the bell on dredge followed by a series of single strokes, indicates that an incoming vessel should keep the dredge to starboard when passing. An outgoing vessel should keep the dredge to port.

A series of double strokes following the rapid ringing of the dredge's bell, indicates that an incoming vessel should keep the dredge to port when passing. An outgoing vessel should keep the dredge to starboard.

By day, vessels working on construction, and floating equipment, shall display a red cylinder; at night, a red light between two white lights, vertical, visible all around the horizon.

1-63 MINESWEEPER SIGNALS.—The following signals are made by East German vessels engaged in minesweeping:

By day, a black ball displayed at the masthead and a black ball at each yardarm, indicating the sides considered dangerous to pass.

At night, green lights shown in similar positions as the balls.

In addition, minesweepers display the International Code flags "HF" to warn other ships against approaching too closely. Minesweepers at work should not be closed or have their courses crossed within 1/2 mile. Ships must not pass between minesweepers.

1-64 FIRING PRACTICE—NAVAL MANEUVERS.—Gunnery, aerial bombing, and torpedo firing occurs at various times and locations along the East German coast. Shipping is forbidden, or otherwise subjected to special regulations within the firing area. Firing notices may be posted or broadcast, and warning signals made from signal masts or patrol boats. The following signals are made:

By day, two "B" flags of the International Code displayed vertically.

At night, a red light above two white lights, vertical.

Ships can pass through the firing area when the first repeater of the International Code is displayed in conjunction with the day signal, or the lights are extinguished.

At night, a tug towing a target sled carries, in addition to tow signals and navigation lights, three lights, vertical, where best seen. The two upper lights are red, the lower light, white.

By day, two black cones, vertical, are displayed points down.

At night, with an approaching ship nearing the target sled, the tug will show a flare-up light. The sleds show a white light forward and aft when not being fired upon.

1-65 DISTRESS SIGNALS.—International distress signals are applicable.

1-66 SPEED SIGNALS.—There are no special signals. Steerageway must be maintained at all times.

1-67 TRAFFIC SIGNALS.—The following signals indicate entry and departure restrictions at East German ports:

By day, entry prohibited on display of a cone, point up, between two balls.

At night, a white light between two red lights, vertical.

By day, departure prohibited on display of a cone, point up, between two cones, points down.

At night, a white light between two green lights, vertical.

By day, entry and departure prohibited on display of a ball below two cones, points together.

At night, a green light above, a white light in the middle, and a red light below.

By day, the channel is blocked on display of three black balls, vertical.

At night, three red lights, vertical. Ships sighting these signals must await instructions before proceeding, or the arrival of an escort vessel.

1-68 MARITIME CONTROL SIGNALS.—East German patrol craft, implementing the sovereign rights of the State, can order ships to stop in the territorial waters of East Germany. The following signals signify STOP:

By day, displaying the International code flag "K" or "N".

At night, the showing of five green stars.

PILOTAGE SIGNALS.—See section 1-105.

SUBMARINE SIGNALS.—See section 1-98.

QUARANTINE SIGNALS.—See section 1-100.

POLAND

1-69 STORM SIGNALS.—Visual storm

Warning signals are made at numerous places along the Polish coast. Their locations will be described with related features. Radio navigational warnings for Polish waters are transmitted daily (H.O. Pub. 117A). Storm warnings are broadcast daily, in plain English for Polish harbors and coastal waters, by Radio Gdynia (H.O. Pub. 118A). Polish storm signals are as follows:

A square yellow flag, or a green light over a white light indicates winds of force 5.

A black ball, or a white light over a green light indicates winds of force 6 to 7.

A black cylinder, or a green light over a white light indicates squalls over force 6.

A black cone, point up or two red lights indicates northwesterly winds of force 8 to 11.

A black cone, point down, or two white lights indicates southwesterly winds of force 8 to 11.

Two black cones, points up, or a red light over a white light indicates northeasterly winds of force 8 to 11.

Two black cones, points down, or a white light over a red light indicates southeasterly winds of force 8 to 11.

A black cross, or a green light between two red lights, vertical, indicates Hurricane winds of force 12 or over.

A red flag displayed with any of the storm warnings indicates the wind is veering; two red flags, the wind is backing.

All day and night storm signals are vertically disposed.

1-70 ICEBREAKERS.—Poland has a small number of icebreakers to aid ships in coastal shipping lanes during the ice season. Icebreaker headquarters located at Gdynia and Szczecin is under the authority of the Port Captain. Radio communication with either location or with patrol planes will bring aid to icebound vessels.

Table 3

INTERNATIONAL ICEBREAKER SIGNALS—POLAND

BY ICEBREAKER		BY ASSISTED VESSEL
G — — .	I am going ahead; follow me.	I am going ahead; I am following you
A . —	Go ahead (proceed along the ice channel)	I am going ahead (I am proceeding along the ice channel).
J . — — —	Do not follow me (proceed along the ice channel).	I will not follow you (I will proceed along the ice channel).
Q — — . —	Shorten the distance between vessels.	I am shortening the distance.
B — . . .	Increase the distance between vessels.	I am increasing the distance.
P . — — .	Slow down.	I am slowing down.
N — .	Stop your engines.	I am stopping my engines.
H	Reverse your engines.	I am reversing my engines.
L . — . .	You should stop your vessel instantly.	I am stopping my vessel.
4 —	Stop. I am ice-bound.	Stop. I am ice-bound.
5	Attention.	Attention.
Y — . — —	Be ready to take (or cast off) the tow line.	I am ready to take (or cast off) the tow line.
.. — . .	Stop. Your headway (given only to a ship in an ice channel ahead of and approaching or going away from the icebreaker). This signal should not be made by radiotelephone.	I am stopping my headway.

See section 1-50. Icebreaker signals are made by whistle or siren, visually, or by radiotelephone. The signal "K" from the icebreaker serves to remind ships of their obligation to keep a continuous radio watch. The signal "WM" indicates icebreaker support is commencing—pay attention to signals. The signal "WO" indicates icebreaker support is finished, proceed to your destination.

1-71 ICEBREAKER ASSISTANCE.—See section 1-51. Ships not following instructions of the icebreaker relieve the latter of all responsibility. The icebreaker can take a ship in tow whenever the situation warrants such action. Ships assisted must repeat icebreaker signals. Any vessel requiring future icebreaker assistance must register at the harbor master's office at least 24 hours in advance of arriving or departing port. Ships not reinforced for ice, or having no valid ice certificate, cannot enter Szczecin harbor but can dock at Swinoujscie.

1-72 ICE REPORTING.—The Polish District Weather Bureaus collect and disseminate

ice conditions daily during the ice season from Gdynia and Szczecin. The ice reports are transmitted by the coastal radio station at Gdynia in the Baltic Ice Code, described in H.O. Pub. 117A. Navigational warnings in plain English are also broadcast from this station.

1-73 DISTRESS SIGNALS.—The International Code of Signals are used.

1-74 MINESWEEPING SIGNALS.—Polish minesweepers engaged in sweeping will make the following signals:

By day, three black balls, one displayed at the foremasthead and the others at either end of the foremast yardarm, or on the side or sides on which the sweeping gear is towed.

At night, green lights are shown in a manner similar to the balls. A white light, visible all around the horizon for at least 2 miles, is shown from the forepart of the vessel.

1-75 FIRING PRACTICE AND NAVAL MANEUVERS.—Vessels of naval units, anchored and unable to show prescribed anchor lights, shall show two white lights visible

for 2 miles around the horizon. One light is placed close above the hull at the stern; the other on the bow at a greater height.

One of a group of naval vessels at anchor can show one blue light independently of other prescribed lights.

Vessels in single column formation, except for the last vessel, can show two white lights in addition to the prescribed stern light. One of these lights, shown from the mainmast, is beamed toward the stern; the other light is carried above the stern light.

Ships engaged in practice firing exercises display a red flag at the masthead. At night, a red light visible all around the horizon, is shown above the prescribed white light on the foremast.

1-76 DREDGE SIGNALS.—Dredges and salvage vessels should be passed at slow speed and with caution. The following signals are to be made by dredges:

By day, a black ball where best seen on the side they are to be passed. In addition a red flag is displayed where best seen.

At night, a green light below a red light on the side which is clear for passage. Also, a red light shown at the same level at each side of the dredge. In addition, a red light is shown where best seen.

During thick or foggy weather a bell is struck loudly for 5 seconds every minute. After a short interval 5 distinct strokes on the bell indicates a clear passage on the side of the fairway. Five separate double strokes on the bell indicates a clear passage on the right side of the fairway.

1-77 SPECIAL SERVICES SHIPS.—Ships of special State services display their service flags, by day, where best seen.

At night, a green light is shown above the light on the foremast.

1-78 EXPLOSIVES SIGNALS.—Ships carrying a cargo of explosives or flammable materials shall make the following signals:

By day, the International Code Signal flag "B" displayed where best seen.

At night, a red light visible around the horizon is shown at the masthead.

1-79 MARITIME CONTROL SIGNALS.—Polish patrol craft, implementing the sovereign rights of the State, can stop ships in the territorial waters of Poland. Warning shots followed by the firing of two green flares signifies STOP. The following "stop" signals are also made:

By day, International Code Signal flag "K" is displayed.

At night, two green lights vertical, are shown at least 1 1/2 feet above the white light on the foremast. The lights are visible around the horizon.

National Guard units, while on duty, show a violet light visible for at least 2 miles and located above the white light on the foremast.

1-80 NAVIGATION AND SOUND SIGNALS.—When a ship, because of its draft or size, must use the deepest part of the fairway, it shall make the following signals at the foremasthead or where best seen:

By day, a black cylinder.

At night, two green lights, vertical, at least six feet apart and shown to the left of the ship's keel line.

Cable and chain ferries crossing a fairway in fog will sound a single stroke on the bell every 4 or 5 seconds.

Ships underway but unable to maneuver, will sound on the approach of other vessels one long and two short blasts, repeated as necessary.

Ships afire, or endangered by fire, will sound two short and one long blast every minute. This signal, accompanied by a continuous ringing of the bell, must be repeated until help arrives.

A ship desiring the attention of another ship will sound one long blast.

A ship desiring to overtake another ship will sound one long, two short, and one long blast. The overtaken ship, if it agrees, will sound one long, one short, one long, and one short blast.

A special State service ship desiring to stop another vessel will sound two long and two short blasts.

1-81 NAVIGATION HAZARDS SIGNALS.—A wreck lightship or a shipwreck is marked where best seen as follows:

By day, a green ball displayed at the same height on each side of the marker or wreck.

At night, a green light shown in the same positions as the daymarkers.

Floating installations, moored, will display a red flag by day and show a red light at night.

A ship observing a red flag by day and a red light at night, moved vertically from land, a bridge, or another ship, must STOP. The ship may PROCEED when a green flag and green light replace the red signals.

1-82 TRAFFIC SIGNALS.—The following signals indicate entrance and departure restrictions at Polish ports:

By day, entry into port is forbidden when a cone, point up, is displayed between two balls, vertical.

At night, a white light is shown between two red lights, vertical.

By day, departure from port is forbidden when a cone, point up, is displayed between two cones, points down, vertical.

At night, a white light is shown between two green lights, vertical.

Entry, departure, and movement of ships within the port is forbidden by day, when a ball below two cones, points together, is displayed.

At night, a white light with a green light above it and a red light below it indicates similar conditions.

Where a serious emergency necessitates the absolute closing of a port, the following signals are made:

By day, three black balls, vertical.

At night, three red lights, vertical.

When part of the fairway or an individual basin is closed to navigation, the following

signals are made where best seen at the area of closure:

By day, a green ball with a red flag above and a red flag below the ball.

At night, a green light between two red lights, vertical.

PILOTAGE SIGNALS.—See section 1-106.

SUBMARINE SIGNALS.—See section 1-97.

QUARRANTINE SIGNALS.—See section 1-100.

CUSTOMS SIGNALS.—See section 1-102.

U.S.S.R.

1-83 STORM SIGNALS.—Visual storm signals are made by the Russian System at various places on the coasts of U.S.S.R., Lithuania, Latvia, and Estonia. The locations of the storm signal stations are given with related features in Chapters 8, 9, and 10 of this publication. The coastal radio stations at Kaliningrad and Klaipeda broadcasts weather conditions and storm warnings for the southern Baltic in English. Riga Radio transmits the weather and ice conditions, the latter in the Baltic Ice Code, for the entire Baltic and Gulf of Riga. See H.O. Pub. 118A for details. See Table 4 for Storm Signals.

1-84 ICEBREAKERS.—The Russian government maintains icebreakers to assist in the navigation of Baltic and territorial waters off the coast of the Baltic States during the ice season.

Table 5 gives the signals used by icebreakers while assisting ships in the waters off the Russian, Lithuanian, Latvian, and Estonian Coasts. These signals are made by whistle or siren, and except for No. 6, must be repeated by the assisted vessels in the order that they follow the icebreaker. See section 1-50.

Table 4

STORM SIGNALS — U.S.S.R.

No.	Day	Night	Meaning
1	Black cone, point up.	Two red lights, vertical.	Wind force 8 or over, from N.W.
2	Black cone, point down.	Two white lights, vertical.	Wind force 8 or over, from S.W.
3	Two black cones, points up.	Red light over white light.	Wind force 8 or over, from N.E.
4	Two black cones, points down.	White light over red light.	Wind force 8 or over, from S.E.
5	One black ball.	One red light.	Wind force 6-7.
6	Two black balls, vertical.	Two red lights, horizontal.	Heavy squall.
7	One black cross.	Four red lights, at the angles of a diamond.	Hurricane.
8	One black T over another inverted.	One green light.	Wind force 5 or over.
9	One black T, inverted.	Three red lights, at the angles of a triangle, point up.	Wind force 6-7, from N.W.
10	One black T.	Three red lights, at the angles of a triangle, point down.	Wind force 6-7, from S.W.
11	Two black T's inverted, vertical.	One red light over No. 9.	Wind force 6-7, from N.E.
12	Two black T's, vertical.	One red light under No. 10.	Wind force 6-7, from S.E.
13	One black flag or one black cylinder.		Wind expected to veer.
14	Two black flags or two black cylinders, vertical.		Wind expected to back.
15	Two black horizontal bars, vertical.		Weather predicted for to-morrow.
16	One black horizontal bar.		Weather predicted for to-day.

(1) Signals are displayed from signal masts as follows: Signals nos. 5-8, from the mast-head; Signals nos. 1-4 and 9-12, from the lefthand side of the yardarm as seen from seaward; Signals nos. 13-16, from the righthand side of the yardarm; when hoisted, Signals nos. 15-16 are displayed above 13-14.

(2) Signals nos. 1-4 indicate storms and storm direction; Signals nos. 5-8 indicate wind force; Signals nos. 9-12 indicate wind direction; Signals nos. 13-14 indicate shift in wind direction; Signals nos. 15-16 indicate forecast period.

(3) When Signals nos. 5-8 are displayed, wind direction is indicated by the simultaneous display of Signals nos. 9-12.

(4) Signal no. 8 is displayed only in areas frequently navigated by small vessels for whom winds of force 4-5 are dangerous.

(5) Signals nos. 5 or 8 and 9-12 are lowered if wind is expected to increase to force 8 or more and replaced with Signals nos. 1-4 or 6-7 with 9-12.

(6) Signals nos. 13-14 are displayed, as necessary with Signals nos. 1-4 and 9-12.

(7) Signals nos. 15-16 are displayed simultaneously, when appropriate, with Signals nos. 1-12.

(8) The absence of Signals nos. 15-16 from signal masts displaying weather signals indicates that the expected weather will set in during the next 12 hours.

(9) Signals nos. 15-16 are not displayed at night.

(10) The replacement of day signals with night signals and vice versa is made at sunrise and at sunset, respectively.

1-85 ICEBREAKER ASSISTANCE.—See section 1-51.

1-86 ICE REPORTING.—The movements and positions of icebreakers are reported daily by radio. Ships requesting assistance through the ice can radio the master of the icebreaker. If in port, the request is made through the Harbor Authority.

Visual signals reporting ice conditions in the Gulf of Riga, and approaches thereto, including the position of the icebreaker, are made at Ventspils (sec. 9C-10).

The coastal radio station at Kaliningrad broadcasts daily, in plain English, ice reports for the southern part of the Baltic. Riga Radio transmits daily ice conditions for the entire Baltic and Gulf of Riga in the Baltic Ice Code (H.O. Pubs 117A and 118A).

1-87 LIGHTSHIP SIGNALS.—Russian lightships are described in H.O. Pub. 116,

the List of Lights. Danger signals are made at the lightships when a vessel is seen standing into danger. These signals consist of the International Code flags "JD" displayed by day. Rockets, exploding twice each minute into bright stars, are also shown day and night.

Lightships out of position discontinue their characteristic lights, fog signals, and make the following signals:

By day, two blackballs or two red flags, one at the bow and the other at the stern.

At night, two red lights shown in similar positions.

In addition, the International Code signal "PC" is displayed by day. A red and white light, flashed simultaneously, or a blue light every fifteen minutes, are shown at night.

1-88 TIDAL SIGNALS.—Table 6 gives tidal signals for the U.S.S.R.

Table 5

INTERNATIONAL ICEBREAKER SIGNALS—U.S.S.R.

BY ICEBREAKER		BY ASSISTED VESSEL
G — — .	I am going ahead; follow me.	I am going ahead; I am following you
A . —	Go ahead (proceed along the ice channel)	I am going ahead (I am proceeding along the ice channel).
J . — — —	Do not follow me (proceed along the ice channel).	I will not follow you (I will proceed along the ice channel).
Q — — . —	Shorten the distance between vessels.	I am shortening the distance.
B — . . .	Increase the distance between vessels.	I am increasing the distance.
P . — — .	Slow down.	I am slowing down.
N — .	Stop your engines.	I am stopping my engines.
H	Reverse your engines.	I am reversing my engines.
L . — . .	You should stop your vessel instantly.	I am stopping my vessel.
4 —	Stop, I am ice-bound.	Stop, I am ice-bound.
5	Attention.	Attention.
Y — . — —	Be ready to take (or cast off) the tow line.	I am ready to take (or cast off) the tow line

Table 6

TIDAL SIGNALS — U.S.S.R.

No.	Day	Night	Meaning
1	A black cone, point down	A white light over a green light	Low water.
2	A black cone, point up	A green light over a white light	High water.
3	A black cone, point down	A green light	Height above datum, 1 unit = 8 inches.
4	A black cylinder	A red light	Height above datum, 5 units = 3 ft. 3 inches.
5	A black ball	A white light	Height above datum, 25 units = about 16 ft. 5 inches.
6	A white cylinder	A red light	Height above datum, 1/2 unit = about 4 inches.

The height of the tide above datum is measured in units of 20 centimeters (about 8 inches). Cones or balls indicating units may be in one or two vertical lines. The cylinder indicating one half of a unit may be hoisted below, or to the left of, the other unit signals.

1-89 DISTRESS SIGNALS.—The International Code of Signals are used.

1-90 DREDGE SIGNALS.—Russian dredges display a white pennant with a light blue band, superimposed with a red star in a white circle.

Dredges working in channels, fairways, or shipping lanes must make the following signals in addition to the prescribed lights and signals for a vessel at anchor:

By day, a black ball with a black cone under or over it, point up, on the side where a ship must not pass.

At night, two red lights, vertical, shown under similar conditions and visible all around for not less than two miles.

At night, two green lights, vertical, shown all around for not less than two miles indicates the side where a ship may pass.

By day, a black ball with a black cone under or over it, point up, displayed on both sides of the dredge, indicates passing is not allowed on either side.

At night, two red lights, vertical, shown on both sides denotes no passing on either side.

If a dredge is working nearly at right angles to the channel, appropriate signals for passing must be made indicating the side where a ship may pass and may not pass.

In fog, a dredge working will ring the bell followed by 3 prolonged blasts on the whistle.

Ships desiring to pass a dredge should do so at slowest speed. When about one-half mile distant, sound one prolonged blast which denotes a request for passage. The dredge, hearing this signal, will indicate the side that is safe for passing, as follows:

One prolonged blast means ship should keep to the right of the channel.

Two prolonged blasts means ship should keep to the left of the channel.

Three prolonged blasts means the channel is closed, await clearance.

If there is no answering sound signal from the dredge the approaching ship must assume there is no clear passage.

Ships passing a dredge must not overtake one another. The ship departing port is favored when passing a dredge.

Ships passing a dredge are forbidden to tow cables, chains etc. on the bottom. The anchors may not be carried below the fore-foot.

1-91 This section is open for future use.

1-92 HYDROGRAPHIC SIGNALS.—U.S.S.R. ships, engaged in survey operations, display a blue pennant having on it a white disc bearing the figure of a lighthouse.

1-93 MARITIME CONTROL SIGNALS.—

The territorial waters of Lithuania, Latvia, and Estonia are controlled by the U.S.S.R. Patrol vessels desiring to stop a ship will display the International Code flag "K" by day and at night show two greenlights, vertical, above the masthead light. The ship to which this signal is directed must STOP, until directed to proceed.

If it is prohibited to enter certain coastal waters of the U.S.S.R., or to limit a free choice of routes through these waters, a warning service will be carried out by guardships, patrol craft, and coast stations. The warning service vessels and stations are distinguished as follows:

By day, a triangular blue flag.

At night, three blue lights at the gaff, vertical. The following signals are made by these vessels or stations to indicate entry or navigation in an area is prohibited:

By day, three red balls, vertical.

At night, three red lights, vertical. These signals are also made when a harbor is closed for military or security reasons. Vessels must then anchor outside the port or put to sea.

1-94 TRAFFIC SIGNALS.—The signals prohibiting entry and departure of the various harbors controlled by the U.S.S.R. are those prescribed by the Lisbon Convention of October 23, 1930. Harbor entry is forbidden in fog or snow unless previous arrangement was made by radio. If a gun or rocket signal is fired by a shore battery, ships must stop immediately and heave to. The following signals indicate entry and departure restrictions of harbors under U.S.S.R. control:

By day, entry prohibited on display of a cone, point up, between two balls.

At night, a white light between two red lights, vertical.

By day, departure prohibited on display of a cone, point up, between two cones, points down.

At night, a white light between two green lights, vertical.

By day, entry and departure prohibited on display of a ball under two cones, points together.

At night, a green light above, a white light in the middle, and a red light below.

By day, the channel is blocked on display of three black balls, vertical.

At night, three red lights, vertical.

By day, a black ball between two black cylinders, vertical, indicates movement of harbor craft and boats is prohibited.

At night, a red light between two white lights.

Ships sighting these signals must await instructions for proceeding, or the arrival of an escort vessel.

PILOTAGE SIGNALS.—See section 1-107.

SUBMARINE SIGNALS.—See section 1-99.

QUARANTINE SIGNALS.—See section 1-100.

CUSTOMS SIGNALS.—See section 1-103.

SUBMARINES—SIGNALS

1-95 SWEDISH SUBMARINES AND ACCOMPANYING SHIPS.—Swedish naval ships serving as targets for, or engaged in exercises with submarines, display a red flag at the masthead. In addition, ships conveying submarines will display a group from the numeral table in the International Code indicating the number of submarines in the company. The signal is a warning to vessels that submarines are in the vicinity; vessels observing it should give a conveying vessel a berth of at least 1 mile if possible and keep a good lookout for submarines, whose presence may only be indicated by their periscopes above water. They should also navigate with care, as submarines rising are not always in a condition to maneuver immediately, or to show the proper signals for a vessel not under control.

Swedish submarines underway on the surface at night in place of the white lights prescribed in Rule 2 (a), paragraphs (i) and (ii) of the International Regulations for Preventing Collisions at Sea carry a blue light at the fore staff and a white top light in another suitable position; the white light having a visibility of 5 miles and the blue light, 2 miles. In addition to the sidelights required in Rule 2 (a), paragraphs (iv) to (vi), a second sidelight is shown vertically above or below the first sidelight.

If the course of an approaching ship leads very close, or dangerously close, to a submerged submarine the conveying vessel will

display the signal "HP" or "K", respectively, below or alongside the International Code pennant.

1-96 BUOYS OF SUNKEN SWEDISH SUBMARINES.—Swedish submarines are equipped with rising and telephone buoys as aids to the vessels in case they should sink. Rising buoys are can-shaped, painted red with a dark green lid and are designed to assist members of the crew to rise through the water from a sunken submarine.

Telephone buoys are also can-shaped and painted orange with a white lid, which is fitted with a ring and an electric lamp by which messages in the Morse Code can be communicated by the submarine. Each buoy carries a plate on which are inscribed the name of the submarine and procedure instructions.

When a rising buoy is found it shall not be touched; however, its inscription shall be noted. When a telephone buoy is found the instructions shall be carefully carried out and an attempt made to communicate with the crew of the sunken boat. Great care shall be exercised not to damage the buoys, wires and cables. If a buoy should be damaged or torn away, its previous position should be carefully noted, if possible.

Any vessel sighting such buoys should immediately notify naval vessels in the vicinity, the chief of the marine district, or the Marine Administration, Stockholm. The position, name of the submarine, and any telephone message received from the submarine should be transmitted.

Swedish submarines submerged for long periods without showing their periscopes may tow a small buoy, painted in orange and white horizontal bands and surmounted by a small flag, to indicate their positions and to warn vessels in the vicinity that a submarine is about to surface. In addition to this buoy a submarine may also tow a telephone buoy or display flag "T" of the International Code. Any ship sighting these buoys or flag should pass astern of them.

A submarine submerged at night, and about to surface, may indicate its position by towing a telephone buoy from which a flashing white light is shown. A submarine will surface showing the lights prescribed by International regulations.

Sunken Danish and Finnish submarines may release similar buoys.

1-97 POLISH SUBMARINES AND ACCOMPANYING SHIPS.—Polish submarines on the surface show lights prescribed by International regulations. Ships conveying and exercising with Polish submarines display by day the International Code signal "HP". At night, three blue lights are shown vertically on the masthead in addition to all other prescribed lights.

SUNKEN submarines are equipped with salvage and telephone buoys; the former painted in white and red checkers and the latter, red and white. Both buoys have green double collars between which a cable is wound.

The name of the submarine is painted on both buoys. The telephone buoy has two position lights and instructions in Polish, English and German. The position and any telephone communication received from the submarine should be reported to the Fleet Commander, Gdynia.

1-98 EAST GERMAN SUBMARINES AND ACCOMPANYING SHIPS.—East German submarines on the surface show lights prescribed by International regulations. Ships conveying and exercising with East German submarines display two flags, red with a black diagonal stripe, vertical, where best seen.

SUNKEN submarines release buoys similar to those of Polish submarines.

1-99 U.S.S.R. SUBMARINES AND ACCOMPANYING SHIPS.—Naval ships or craft attending or engaged in exercises with submarines of the U.S.S.R. will display the International Code Signal "HP" or "OIY" on a red, white and blue triangular flag where best seen. In addition, they will transmit by radio or radiotelephone on 600 meters the signal "ALZIV—ISCQU" meaning: 'your attention is directed to submarine (s).'

Ships are cautioned to give a wide berth to any vessel making the above signals. If it is necessary to approach closer, ships should proceed at a slow speed until the flag hoist is lowered or instructions are given as to a safe course to steer. It must

not be inferred that submarines exercise only in company with escorting vessels. A good lookout must always be maintained for periscopes.

SUNKEN submarines of the U.S.S.R. may release two buoys in the form of a truncated cone, the emergent part of which is distinguished by three alternating red and white sectors and a quick flashing white light visible 5 miles. One buoy carries an "H" indicating the bow of the submarine; the other, a "K" indicating the stern. In order to establish contact, the cover of the buoy must be raised, the telephone receiver removed and the call button pressed. When a reply is received, the button is released and voice contact is made.

QUARANTINE

SWEDEN, GERMANY (SOVIET ZONE), POLAND, U.S.S.R.

1-100 SIGNALS.—The International Code of Signals for Quarantine, as described in appendix "C" of H.O. Pub. 87, is recognized by the above countries.

The coastal quarantine stations for Sweden, contained in this publication, are located at Kalmar and Stockholm. In East Germany, Sassnitz and Stralsund are quarantine stations. All the principal ports of Poland have quarantine stations. The U.S.S.R. maintains quarantine facilities at Kaliningrad, Klaipeda, Ventspils, Riga and Parnu. Health Officers board ship, examine and grant Pratique at any of these ports.

The Health Authorities of many ports, including Kalmar and Stockholm, will accept radio messages, transmitted prior to arrival of the ship, giving a Declaration of Health. Generally, ships arriving from an infected port must transmit health conditions aboard ship four to twelve hours before E. T. A.

Until Pratique is granted the appropriate Quarantine signals must be made. Contact with the shore is forbidden except for the pilot, medical personnel, quarantine and customs officials.

CUSTOMS

SWEDEN

1-101 SIGNALS.—All vessels navigating in Swedish waters are subject to customs in-

spection. Customs vessels display, in addition to the Swedish ensign, a blue triangular flag which has a "T" under a crown, both yellow in color. At night the vessels show an alternate yellow and blue light from a duplex lantern. If the vessels do not stop when the above signals are made, the customs vessel will display the International Code flag "K" by day, or make the letter "K" in Morse code by signaling at night. If the latter signals are disregarded, the customs vessel may fire a blank charge, or sound at least six short blasts on the whistle or siren.

The customs area of Sweden extends four miles off land areas. Sweden and the other Scandinavian countries have a combined customs patrol of their contiguous territorial waters. All the primary and secondary ports of Sweden have either a Customs Office or a Customs Station. There are International Airports near Stockholm.

POLAND

1-102 SIGNALS.—Polish customs vessels display a white pennant with a green border and show two green lights about three feet apart, vertical, from the masthead. A white light is shown below the green lights. Ships must stop when the customs vessel displays the International Code flags "K" or "N" and fires two green rockets.

All merchant ships navigating in Polish territorial waters are subject to customs inspection. Foreign naval vessels are exempt from customs while visiting Polish ports. Foreign merchant ships and pleasure craft are subject to inspection after admission to port. Only those persons authorized by customs are allowed aboard ship in port. Customs offices are located at Gdansk, Gdynia, Wladyslawow, Hel, Ustka, Swinoujscie, Szczecin and Kolobrzeg.

U.S.S.R.

1-103 SIGNALS.—Russian customs vessels display a red flag with a star, sickle and hammer in the upper left corner. Two caducei are entwined in the lower right corner of the flag.

Customs examinations occur at the principal commercial harbors including Kaliningrad, Klaipeda, Ventspils, Riga and Parnu.

Customs usually board ships with the Quarantine officers. Until completion of cus-

toms examination no one can board or leave the ship. Incoming ships are obliged to comply with all the regulations of customs authorities.

PILOTAGE

SWEDEN

1-104 GENERAL.—Sweden is divided into six pilotage districts, each under a pilot director. The three districts with fourteen stations covered in this publication have their headquarters at Malmö (Pub. 41), Kalmar and Stockholm. Pilots are stationed at numerous centers along the Swedish coast. Ports adjacent to these centers receive pilotage support from them. Many pilot stations no longer maintain lookouts. Pilots have to be ordered from the centers by radiotelephone or through a coastal radio station.

Pilotage is compulsory for all foreign merchant vessels except (1) vessels whose net registered tonnage (Swedish measurement) does not exceed 100 tons, (2) vessels employing an icebreaker in icebreaking, and (3) vessels calling at harbors or anchorages for provisions, fuel, sickness or death aboard, or bad weather, provided they only land sick passengers or dead and only take on provisions, fuel, or other ship stores. Pilotage is not obligatory for yachts under 80 net tons.

Pilotage is compulsory for foreign naval vessels, and there are special regulations regarding them. The coastal archipelago between 56°25' N., and 57°15' N. is closed to foreign naval vessels except with special permission.

Only licensed pilots should be employed. If they are not available and other persons are employed, the latter must conduct the vessel only as far as the nearest pilot station. Licensed pilots, when on service, wear a brass plate with a crown over the word "Kronolots".

When pilot stations are open, requests for pilots or emergency calls are made by radiotelephone via Channel 16, frequency 156.80 mc., otherwise Channel 13, 156.65 mc., is used. Requests for pilots should be made at least 3 hours before E.T.A.

SIGNALS.—Swedish pilot vessels display a white and blue flag at the masthead or other conspicuous place. At night, in addition to

the white light over a red light they show an alternating red and white light to approaching vessels. Lightships with pilots on board display at the gaff or at some other conspicuous place the above flag by day and a white light at night.

Pilot signals of the International Code are used to request a pilot. The sound signals, when used, are answered from the pilot vessel by three closely spaced prolonged blasts indicating the pilot is on the way.

Should the pilot be unable to board a ship for any reason the following flag positions will be made:

Held horizontally—Alter course in the direction indicated.

Held upright—Steady.

Waved from side to side—Stop.

At certain stations a black ball with a white band is displayed from a signal mast to indicate that pilots are available and will board a vessel showing the pilot signal as quickly as possible. When all pilots are out, the ball is lowered.

When a pilot wishes to communicate with a vessel he will by day wave the pilot flag on both sides and at night show alternate white and red light signals. Vessels must then heave to or stop to communicate with the pilot.

Special pilot signals, where effective, will be described with the related harbor.

GERMANY (SOVIET ZONE)

1-105 GENERAL.—Ships arriving from foreign ports report through the coastal radio station at Rugen. Pilot requests and E.T.A. at pilot station may be given.

Pilotage is compulsory in all East German ports, the sea lanes and approaches thereto, for all vessels over 150 metric tons. Foreign naval ships can enter the waters and ports of East Germany by Government permits issued through diplomatic channels.

SIGNALS.—Pilot signals of the International Code are used to request a pilot. The pilot vessel displays the "H" flag of the International Code and at night shows the lights prescribed by the International Regulations for Preventing Collisions at Sea.

Should the pilot be unable to board a ship for any reason the pilot vessel will lead into port, directing the following ship by signals

made by a movable arm or by flag signals similar to the Swedish system. If the pilot vessel is unable to meet the incoming ships on station these signals will be made from a beacon ashore. Details of pilotage procedure that differ will be described with port approaches.

POLAND

1-106 GENERAL.—Pilotage is performed by State Pilots working from the office of the harbor master. It is compulsory for all foreign ships, including harbor movements, with some exceptions. The latter include foreign yachts belonging to yacht clubs and special port declarations concerning draft and tonnage. These will be described with the particular port.

SIGNALS.—Pilot signals of the International Code are used to request a pilot. The sound signal is the Morse code letter "G" on whistle or siren. In addition to the prescribed signals at night, a white light may be shown for 5 seconds every 2 seconds.

Should the pilot be unable to board a ship for any reason, the pilot vessel will display the International Code signal "JT" by day and make the same signal by Morse code at night. The arriving or departing ship will then follow the pilot vessel, keeping about 300 feet astern, until it is safe for the pilot to come aboard.

U.S.S.R.

1-107 GENERAL.—Pilotage is performed by State Pilots of the U.S.S.R. and is compulsory for merchant vessels at all ports of the U.S.S.R. where a pilotage service is maintained. This includes Parnu, Riga, Ventspils, Klaipeda and Kaliningrad, customs ports open to foreign ships. Foreign naval ships calling at U.S.S.R. ports are obliged to use pilots. Special regulations are in force.

SIGNALS.—Pilot signals of the International Code are used to request a pilot. If a pilot is available, the pilot flag is displayed at the pilot station; if no pilot is available, a ball is hoisted. Locations of pilot stations will be given with the port description.

REGULATIONS

OIL POLLUTION

1-108 PREVENTION OF THE POLLUTION OF THE SEA BY OIL.—The Oil Pollution Act, 1961, of the United States, in implementing the provisions of the International Convention for the Prevention of Pollution of Sea by Oil, 1954, designates prohibited zones throughout the world within which the discharge of oil or any oily mixture which fouls the surface of the sea is unlawful. The intent of the act is to insure that oil or oily mixtures are discharged at a sufficient distance offshore to insure that coastal waters, beaches, and shores will not be contaminated.

All seagoing ships of American registry are subject to the provisions of the Oil Pollution Act with the following exceptions: ships used as naval auxiliaries, ships navigating in the Great Lakes of North America, tankers under 150 gross tons, ships under 500 gross tons, and ships other than tankers 500 gross tons, and ships engaged in the whaling industry. These exceptions are subject to specific regulations for their particular disposition. A distinction is made between tankers and ships other than tankers in these regulations. Tankers of 150 tons are subject to this regulation within all areas.

It should further be considered that all foreign vessels will abide by these or similar regulations in the common interest established by the International Convention.

Nothing in the Oil Pollution Act, 1961, or in the regulations issued thereunder shall be construed to modify or amend the provisions of the Oil Pollution Act, 1924 (33 U.S.C. 431-437), or of section 89 of title 14, United States Code.

The prohibited zones in this volume for tankers and ships other than tankers shall be all sea and port areas within the Baltic Sea.

Notices to Mariners should be consulted with respect to the reduction or extension of the prohibited zones. Charts of prohibited zones are available.

SWEDEN

1-109 PROHIBITED AND DEFENSIVE AREAS.—These areas are charted and warnings of practice firing on gunnery ranges are broadcast by radio or indicated in the area by patrol craft or shore signals, us-

usually a red flag or red light at night. Details are described with related coastal features. Vessels over 20 tons should fly their national flag around the clock within defensive areas and inside territorial limits. Vessels should keep to the prescribed channels and should stop if the International Signal "WZ" is made in any manner.

Ships may not enter prohibited areas unless permission in the form of a pass has been granted by the District Marine Chief. A pilot must be aboard, military guards also if prescribed in the pass, and designated channels followed.

Naval Gunnery Ranges are located in Gokelv, Tote, Karlskrona Navy Yard, Torhamn-sudde, and the archipelago southeastward of Ronneby. Details are given with the related coastal feature or port description. Anchoring and fishing are forbidden within 325 yards of firing ranges.

It is prohibited to land and remain on several islands and regions close to the Swedish coast. Notices are posted to this effect. This edict pertains also to military installations and naval dockyards. Foreign ships should obtain copies of the Police Regulations for restrictions against photography, surveying, anchoring etc. in defensive areas.

Permanent minefields are located in the approaches to Ystad, Ronneby, Karlshamn, Karlskrona, Kalmar, Oskarshamn, Slite, Farosund, Granklubben, Malsten, Stockholm, between Lerskar and Botveskar, Arholma and Bjorko. Limits and details are described with the port. There are areas where mines may be adrift on the bottom within the Swedish archipelago. Anchoring and fishing is prohibited in all mined areas.

1-110 PROTECTED AREAS.—The areas in this publication are located in the regions of Soderarm, Sandhamn, Vaxholm, Uto, Farosund, Gotland and Gotska Sandon, and the coastal waters between Torhamn-sudde westward to the island of Tarno. Foreign vessels passing through these protected areas must adhere strictly to the several pilotage channels, anchor and berth only where and when prescribed in the Police Regulations. Details of the areas are described with the principal coastal description.

Foreign naval ships can enter protected areas, inner territorial waters and naval ports only after special permission has been arranged through diplomatic channels. Outer territorial waters can be entered without permission but anchoring is forbidden unless in distress.

Foreign submarines are allowed in outer territorial waters only and then must remain on the surface. The national flag must be displayed. If in distress, the inner waters can be entered.

Photography, surveying, mapping, and the taking of soundings is forbidden in protected areas and territorial waters.

1-111 RADIO APPARATUS.—See H. O. Pub. 117A which publishes radio regulations for foreign territorial waters.

QUARANTINE REGULATIONS.—See section 1-100.

PILOTAGE REGULATIONS.—See section 1-104.

GERMANY (SOVIET ZONE)

1-112 GENERAL.—International telecommunications rules are observed. Optical or acoustical signals may be made only to fixed signal stations. Foreign ships can enter ports only where customs officials are located. Rugen radio station must be advised prior to entry into port. Customs inspection is tied in with passport clearance and exchange control. While in port ships are under customs surveillance.

Ships can anchor in the territorial waters of East Germany only where it is customary or when in distress. Foreign naval ships can remain in the waters and ports only when permission has been granted through diplomatic channels. Foreign ships must remain in prescribed sea lanes thereby passing through control check points.

QUARANTINE REGULATIONS.—See section 1-100.

PILOTAGE REGULATIONS.—See section 1-105.

POLAND

1-113 GENERAL.—The administrative authority of the port is vested in the harbor-

master. Permission to enter port is requested via radiotelephone or International Code Signals giving name of ship and call letters. The harbor master grants permission by displaying code flag "C" and the call letters of ship, or by radiotelephone. Ships must not anchor in fairways or bridge approaches. Vessels carrying explosives must anchor as designated and a safe distance from other ships. It is forbidden to overtake other ships in ports and port approaches. Ships departing port have preference in channels and bridge approaches. Ships alongside piers and quays must show white lights fore and aft on the outboard side to mark the extremities of the ship, especially if protruding from dock. The harbor master gives permission to shift berths.

QUARANTINE REGULATIONS.—See section 1-100.

PILOTAGE REGULATIONS.—See section 1-106.

U.S.S.R.

1-114 TERRITORIAL WATERS.—Foreign vessels can freely navigate in territorial waters of the U.S.S.R., provided they keep to accepted sea lanes and avoid prohibited areas which are listed in U.S.S.R. Notices to Mariners, Sailing Directions and Port Decrees. Foreign naval ships and submarines visiting Russian ports must obtain prior permission of the Government and conform to regulations published in U.S.S.R. Notice to Mariners. Foreign ships damaged or in distress must report conditions to the nearest port authority. Fishing and hydrographic work is forbidden.

Foreign merchant ships can enter only those ports where there are customs stations. When approaching ports and within visual signalling distance of a signal station, ships must display their national flag and International Code call letters by day. When requested at night, the call letters are signalled by Morse Code.

Foreign merchant ships in territorial waters having a coastal radio station are forbidden to use radio equipment except if in distress or assisting ships in distress. While in port all radio transmitters and receivers aboard are usually sealed by port officials. See H.O. Pub. 117A for radio regulations.

Fortified Zones are established in various coastal waters of the U.S.S.R. Where passage through a zone is necessary to reach port, a special permit is granted. A pilot must be aboard in transit of a fortified zone. His orders regarding security measures and navigation must be obeyed. The taking of soundings and photography is forbidden.

Patrol craft in territorial waters of the U.S.S.R. display a blue triangular flag by day and show three blue lights, vertical, from the masthead at night.

When entry into territorial waters is prohibited, the patrol craft will display three red balls by day and three red lights at night, vertical.

In fortified zones the national flag, house flag, and call letter signal must be displayed by day from the ship. At night, only the prescribed lights are shown unless the pilot decides otherwise. In fog, passage through any zone is prohibited.

Merchant ships must not hamper or obstruct movements of naval units within the zone. Vessels must not anchor less than 600 yards from the fairway or prescribed route.

QUARANTINE REGULATIONS.—See section 1-100.

PILOTAGE REGULATIONS.—See section 1-107.

CAUTIONS

GENERAL

1-115 SUBMARINE CABLES.—Submarine cables are laid within the area covered by this volume. In view of the serious consequences resulting from damaged submarine cables, vessels should take special care to avoid anchoring or fishing in cable areas.

Vessels fouling a submarine cable should attempt to clear without damaging the cable. Anchors or gear that cannot be cleared should be slipped and abandoned. No attempt should be made to cut a submarine cable.

The owners of vessels who are able to prove that they have sacrificed an anchor, a net, or other fishing gear, in order not to damage a submarine cable, may be compensated by the owner of the cable.

In order to establish a right to such compensation it is necessary, if possible, immedi-

ately after the accident, to draw up a report confirming the loss, supported by the testimony of the men in charge of the equipment. The master of the vessel, within 24 hours after his arrival at the first port of return, or call, must make his report to competent authorities. They will notify the consular authorities of the country of the owner of the cable.

1-116 LIGHTS ON U.S.S.R. FISHING VESSELS.—In certain waters of the Baltic Sea and Gulf of Finland, Russian fishing vessels may be encountered at night showing lights in addition to those prescribed for such vessels in the International Regulations for Preventing Collisions at sea. These lights are white, red, green and blue, the brightest being a red light with a visibility of at least 1 mile. The remaining lights have a visibility of not less than 800 yards. Mariners are advised to give such vessels a berth of not less than 2 miles.

1-117 SWEDISH FISHING MARKERS.—In Swedish waters, fishing gear which is not laid in the customary navigational channels is marked with floats by day. At night, a violet light marks the fixed end and a white light the drifting end. Caution must be exercised not to foul the gear.

1-118 DANGER AREAS.—Firing, bombing, and mine exercise areas lying within the limits of this publication are described, whenever possible, with that part of the coast in which they are located. Signals for these areas are given in the signals section. Advance warnings of practice are locally indicated or broadcast by radio.

NEMEDRI (North European and Mediterranean Routing Instructions) should be consulted for the latest information concerning areas which are dangerous because of mines. **NEMEDRI**, where applicable, supersedes any "Directions" or other routing instructions given in this publication. **NEMEDRI** buoys marking fairways and channels through the danger area are not usually described in this volume.

Radio navigational warnings should be obtained for the most recent information on danger areas. Also consult applicable Notices to Mariners.

1-119 U.S.S.R. HYDROGRAPHIC INFORMATION.—The U.S.S.R. does not fully participate in the international practice of exchanging hydrographic information. Oceanographic Office charts and publications covering the coast and adjacent waters of the U.S.S.R. may not be entirely corrected in regard to new dangers, changes in navigational aids, and warnings.

1-120 ABNORMAL MAGNETIC DISTURBANCES.—A large part of the Baltic Sea has not been surveyed for magnetism. Areas covered in this publication where magnetic disturbances have been reported include the following:

1. The area surrounding Bornholm and Christianso.
2. Northern entrance of Kalmarsund between Oskarshamn and Vastervik.
3. Between Oxelosund and Landsort.
4. Passage off the coast of Estonia between the Gulf of Riga and Gulf of Finland.
5. An area extending about 45 miles northward of Riga.

OCEANOGRAPHY

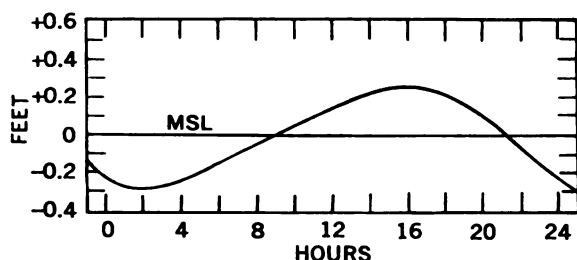
TIDES

1-121 ASTRONOMIC.—The tide in the Baltic Sea is principally diurnal; one high water and one low water occur each tidal day (Fig. 1-a). In The Sound and the Belts the tide exhibits two high waters and two low waters, with a diurnal inequality between the heights of successive high waters and successive low waters. The maximum range of the tide is only about 0.5 foot and may be considered negligible.

METEOROLOGICAL.—The magnitudes of water level fluctuations in this area depend primarily on the strength and duration of the prevailing winds (Fig. 1-b). The greatest variations in water level occur in winter, when storms are most frequent. Persistent strong winds may raise the water level as much as 2.0 feet along windward coasts lower it as much as 2 feet along leeward coasts. During a strong westerly gale the water level may fall as much as 5.0 feet below mean sea level off the south coast of Sweden. During a strong northeasterly gale the water level may rise as much as 6.5 feet above mean sea level off the north coast of

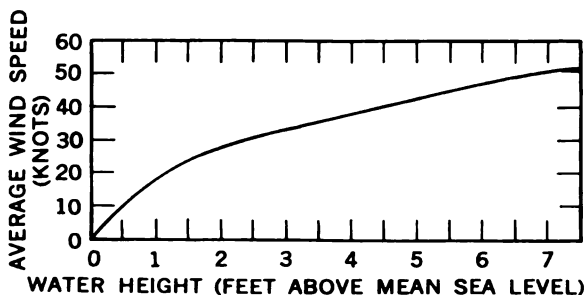
Germany. Irregularities in the shape of the coastline may result in unpredictable local fluctuations. The change in water level is greater in bays and narrows along the coast than in the more open parts of the area.

High barometric pressures cause a decrease in water level, and low barometric pressures cause an increase. The climatic systems that cause these fluctuations usually persist for only a few days but occasionally last for longer periods. When this atmospheric effect is reinforced by strong onshore winds, the resulting current may raise water levels significantly. Any increase or decrease in the discharge of river water into the Baltic Sea also may cause fluctuations in water level.



TYPICAL ASTRONOMIC TIDE CURVE FOR THE BALTIC SEA AND THE GULFS OF FINLAND AND BOTHNIA

Figure 1a



CURVE SHOWING INCREASE IN WATER LEVEL ALONG THE SHORES OF THE BALTIC SEA, GULF OF BOTHNIA, AND GULF OF FINLAND (EXCLUDING THE HEADS OF THE GULFS) RESULTING FROM ONSHORE WINDS

Figure 1b

CURRENTS

1-122 GENERAL SURFACE CIRCULATION.

—The weak and variable surface circulation in the Baltic Sea is generally counterclockwise (Figure 2), but is greatly influenced by winds, which may change and at times reverse the direction of flow. In spring, the snow melt helps maintain a weak but steady outflow of surface water from the Baltic to the Belts and The Sound.

In the northern part of the Baltic, a south-setting current from the Gulf of Bothnia joins the west-setting current from the Gulf of Finland and flows southward along the Swedish coast between Gotland and Oland at a mean speed of almost 0.5 knot.

In the southern part of the Baltic, one part of the current turns westward off Bornholm and flows into the Belts at speeds that are usually less than 0.5 knot. The other part turns eastward along the coast of Poland at speeds ranging between 1.0 knot and 2.0 knots; a portion of this current then turns northward off the coasts of Lithuania and Latvia at speeds less than 0.5 knot. A part of this current sets into the Gulf of Riga, where it flows counterclockwise at weaker speeds, and another part sets into the Gulf of Finland at speeds of less than 0.5 knot.

SUBSURFACE CURRENTS.—Limited observations indicate that subsurface currents of about 0.4 knot flow into the Baltic from the North Sea at a depth of about 130 feet. The subsurface currents usually flow along the coast of Poland and mix with the surface currents setting out of the Baltic Sea. In general, the subsurface currents follow the surface pattern; data show no significant decrease in speed with depth.

WIND EFFECTS.—Drift currents may not set in the direction of the prevailing wind, inasmuch as the origin of these currents may be traced to winds at a considerable distance or even to winds of previous days. Therefore, the current sometimes may set at any angle to the prevailing wind.

Strong easterly winds drive significant volumes of water from the Gulf of Finland, Gulf of Riga, and central and southern Baltic toward the western Baltic and cause currents which generally set toward the North Sea.

Strong westerly winds drive large volumes of water from the Skagerrak, Kattegat, Belts, and western Baltic toward the southern and central Baltic and cause strong currents in the Baltic, as well as changes in the direction of flow in the regions of Bornholm, Oland, and Gotland. A strong prevailing northwesterly wind from the North Sea often prevents the current that flows from The Sound into the Baltic from turning northward and drives the water against the German coast.

Storms often cause currents and eddies in the Baltic. Currents may be generated by storms several hours in advance of the storms' arrival in the Baltic, especially in Kalmarsund and along the German coast. During severe storms, surface currents may attain speeds as high as 4 knots in the southern Baltic, in the regions of Bornholm, in Kap Arkona on the German coast, and in Sandhammaren on the Swedish coast. The south-setting current flowing through Kalmarsund often reverses its direction during storms and may reach 6 to 8 knots during strong gales.

TIDAL CURRENTS.—Tidal currents in the Baltic Sea are extremely weak or negligible and are relatively unimportant in comparison to the general circulation and wind-driven currents.

SEA AND SWELL

1-123 GENERAL.—Average sea and swell conditions for the open waters in the area are presented graphically by roses and bar graphs for the four seasons of the year represented in Figures 3 through 6. Based on the number of observations shown, the roses give relative frequencies of selected wave height categories by direction and the bar graphs give the total relative frequency for each height category. Intensive investigation of swell observations has shown that the frequency of moderate and high swells exceeds the actual conditions.

BOTTOM TOPOGRAPHY.—Because waves shoal and steepen in shallow water, sea and swell waves in the Baltic Sea are often steeper than in the open ocean. However, on the shallow coastal shelves that border most harbors, sea and swell are generally reduced to negligible heights by refraction and bottom friction. Currents have little effect on sea and

swell in these coastal waters, because most currents in this area are caused by winds and thus follow the direction of waves. Of most importance in these shallow waters is the direction of the winds; strong or persistent onshore winds may raise the water level around a harbor by several feet, whereas offshore winds may lower it by similar amounts.

1-124 SEASONAL DISTRIBUTION OF SEA AND SWELL.—During autumn (October, November, December) and winter (January, February, March), the predominance of westerly to southwesterly sea and swell results from the influence of the southwesterly windflow of the fully developed Icelandic low. The frequent passage of severe storms adds to roughness of the seas. However, the sea roughness is reduced by the wide extent of ice cover during the winter. In spring (April, May, June) and summer (July, August, September), local climatic effects are generally more prominent than the large scale climatic controls. Frequent low pressure cells over the water area in spring results in the predominance of northeasterly winds and seas along the Swedish coast and southwesterly winds and seas along the Soviet coast. Land and sea breezes are most effective in summer. Thunderstorms also reach maximum frequency and intensity during summer. frequency and intensity during summer. Westerly to southwesterly winds and seas predominate in this season.

Slight seas (< 3 feet) are the most frequent sea condition in all seasons and range from an average frequency of 43 percent in spring to an average frequency of 64 percent in autumn. Rough-through-high seas (≥ 5 feet) are most frequent in autumn (20 percent frequency near the Baltic entrance, 33 percent average in the main part) and least frequent in spring (8 percent average). During autumn and winter, seas ≥ 5 feet are considerably less near the entrance than in the main part.

In all seasons, low swell (0-6 feet) is the most frequent swell near the entrance and moderate swell (6-12 feet) is the most frequent swell in the main part of the Baltic. High swell (> 12 Feet) is relatively infrequent near the entrance (> 1 percent fre-

Figure 2

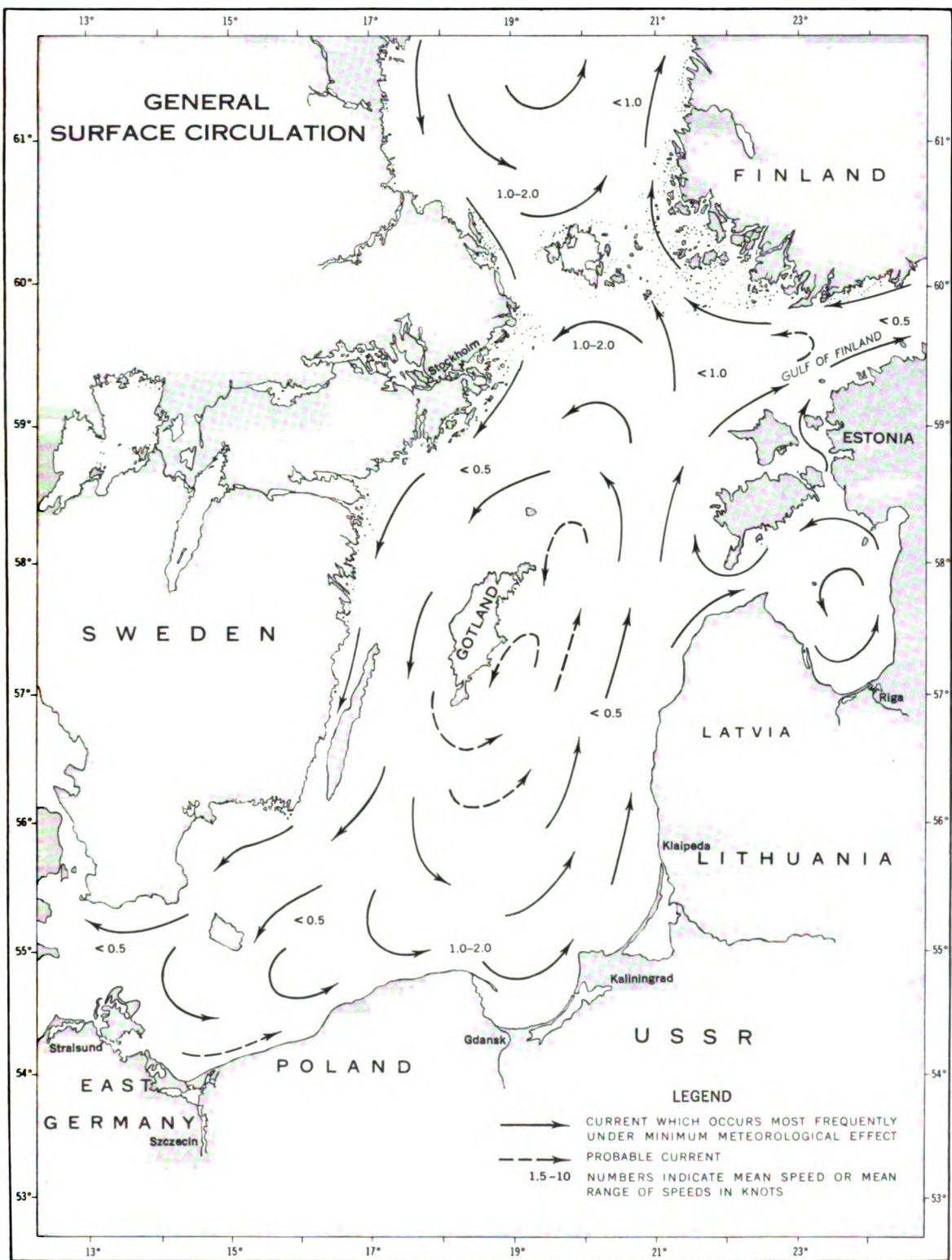


Figure 2

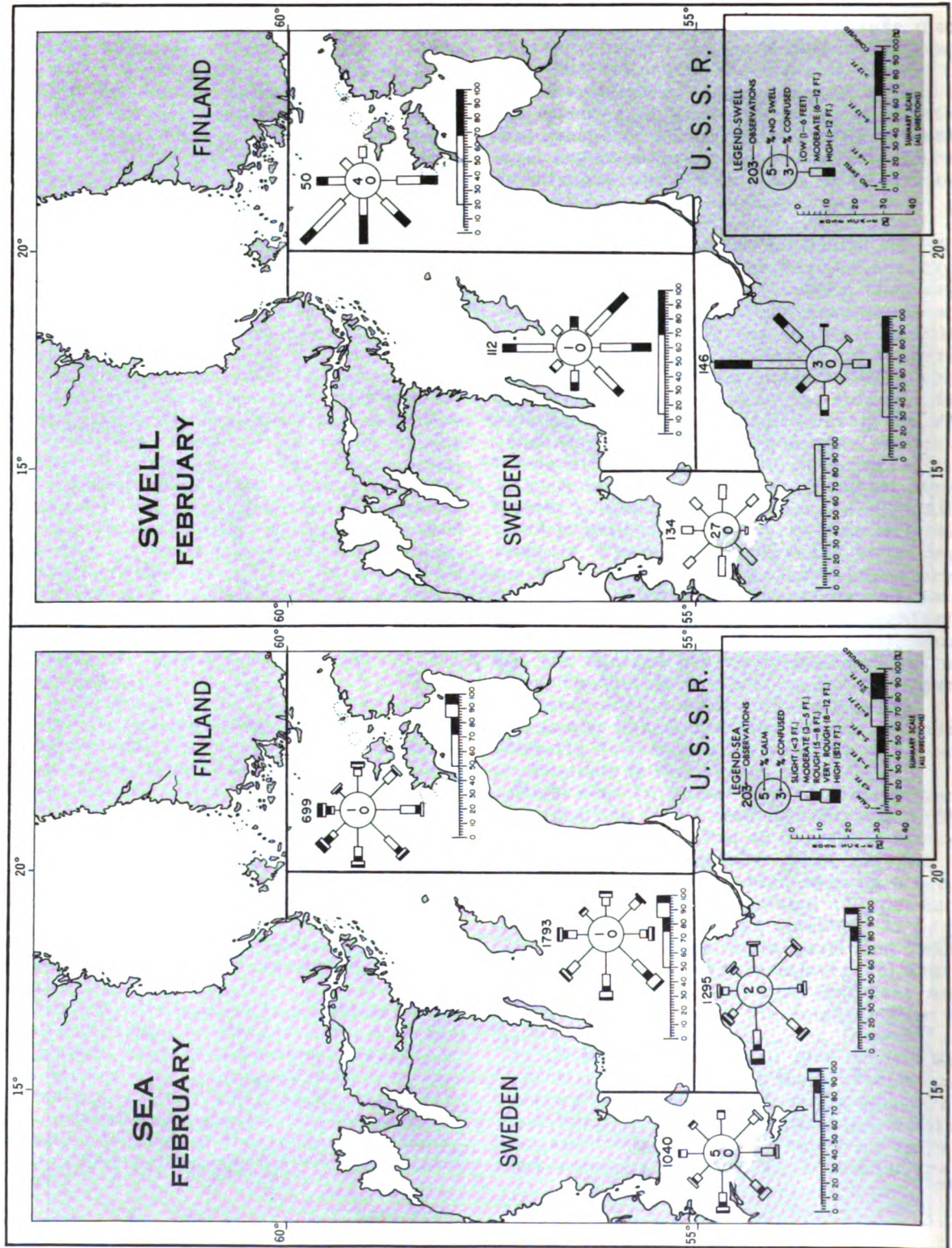


Figure 3 Percent Frequencies Sea and Swell

Figure 4

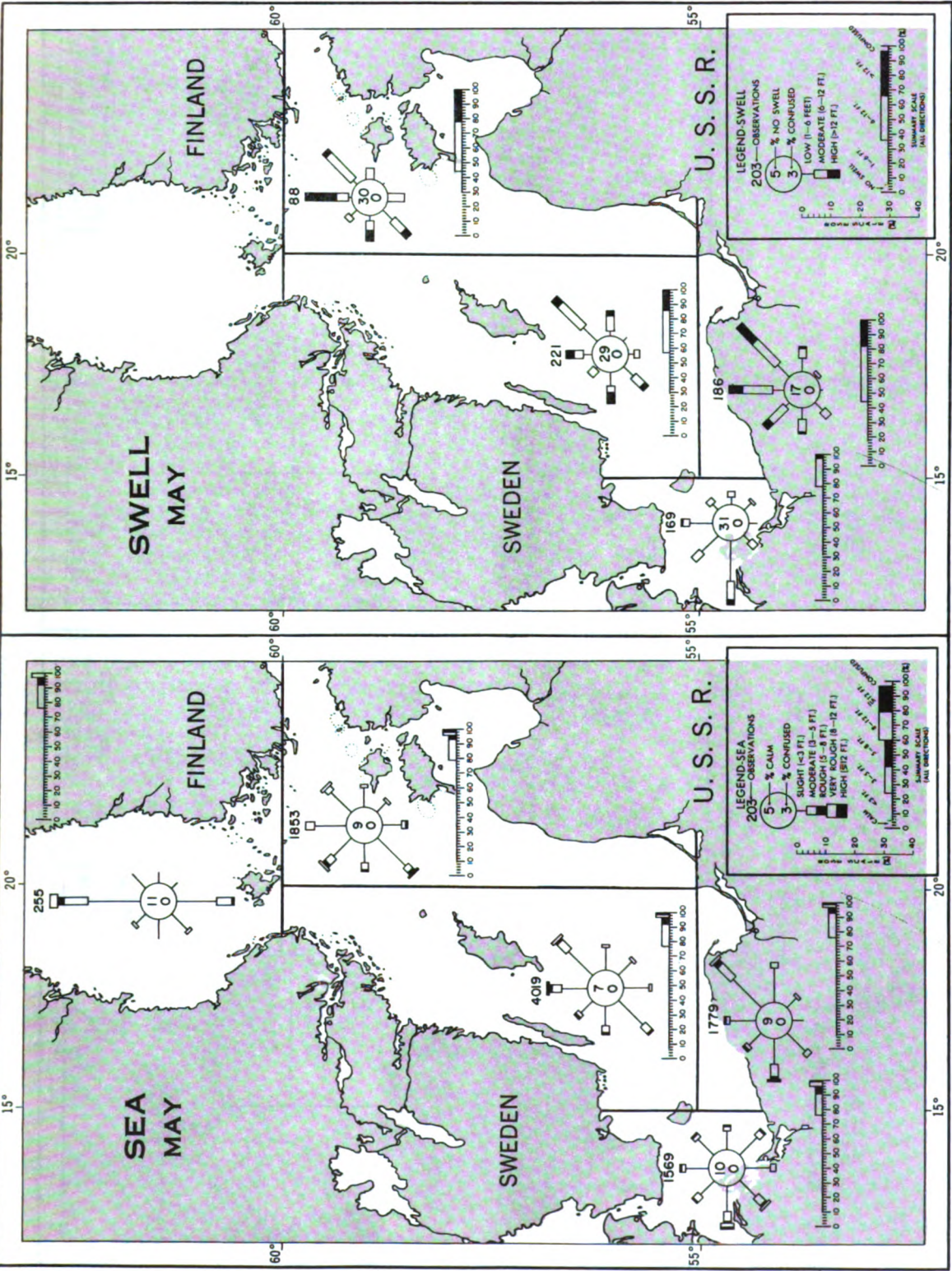


Figure 4 Percent Frequencies Sea and Swell

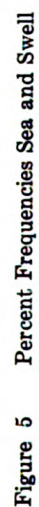


Figure 6

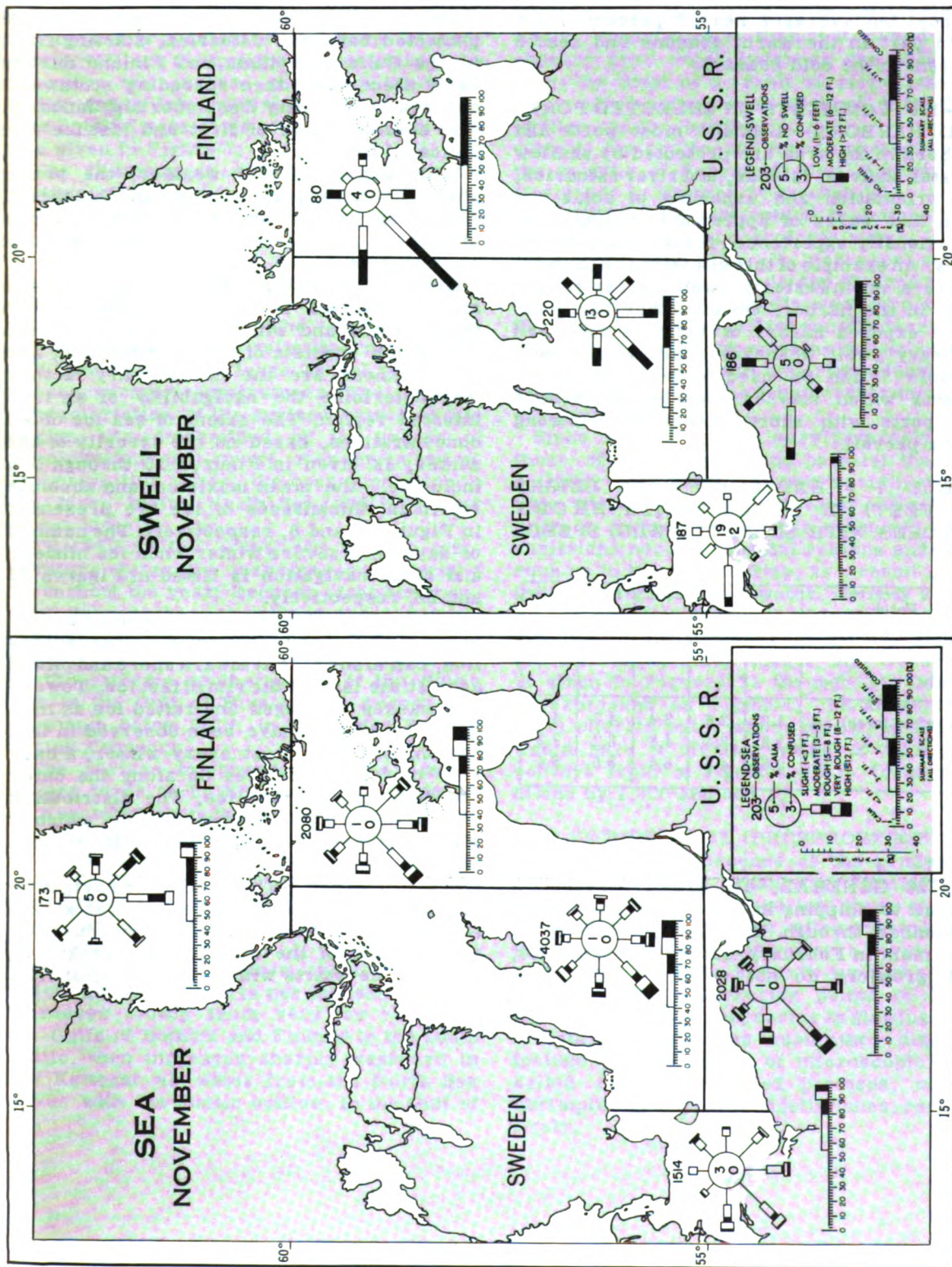


Figure 6 Percent Frequencies Sea and Swell

quency) but averages near 2 percent in the main part in the warm seasons and near 3 percent in the cold seasons.

1-125 COMMENTS ON SELECTED PORTS AND HARBORS.—Although most ports and harbors in the area are protected by shallow coastal shelves, islands, and river estuaries, the orientation and exposure of some are such that waves of appreciable heights are occasionally experienced from certain directions. An example of this situation is Klaipeda, where a northwesterly swell causes roughness in the harbor. On the other hand, the more exposed harbor of Visby is subjected to heavy swell whenever rough seas occur.

Table 7 can be used to determine wave heights which may be expected in harbors and ports with short fetches when strong winds prevail.

TABLE 7 - EXPECTED WAVE HEIGHT (IN FEET) IN REGIONS WITH SHORT FETCHES WITH SELECTED WIND SPEEDS

Wind (Beaufort force)	Fetch (nautical miles)				
	1	3	5	8	10
6	1.3	2.6	3.4	4.3	4.9
8	1.8	3.4	4.8	6.2	7.2
10	2.5	4.5	6.4	8.5	9.4

ICE

1-126 GENERAL.—Ice usually presents a danger to shipping in this region from early December through late April, reaching its maximum in February. Icebergs, bergy bits, and growlers do not occur in this area.

Ice initially forms in the many shallow protected bays and estuaries, starting first in the Gulfs of Bothnia and Finland during early December, then spreading southward and seaward during December and January. The average dates of first and last ice are indicated in Figure 7.

With continued cold weather, the young shore ice increases in strength and thickness. The extent of the fast ice in various types of winters is depicted in Figures 9 through 14, inclusive.

Drift ice, which consists of broken fast ice and ice formed in open water, floats with the currents and winds. The amount of sea ice, which consists of drift and fast ice, and its thickness are the two primary factors that determine the navigability of an ice-infested region. The extent of sea ice of all concentrations, based on the severity of the winter, is given in Figures 15 through 20, inclusive. The mean maximum and absolute maximum thicknesses of ice are presented in Figures 7 and 8, respectively. The number of days in a severe winter when ice hinders and stops navigation is listed in Figures 21 and 22, respectively.

WIND EFFECTS.—The wind, which can disperse drift ice and thus lower its concentration, can also force it toward shore and pile it against the land or the rim of fast ice. Towering masses of ridged and rafted ice as high as 30 to 40 feet have been observed in this region. During almost every winter, a barrier of rafted ice piles up along the outer boundary of the fast ice. The distribution and characteristics of pressure ice, which is always dangerous to shipping, is illustrated in Figure 8 for this area.

ICE BREAKUP.—The opening of navigation and the disappearance of ice occur at widely varying dates that depend on the duration and severity of the winter. The breakup of the fast ice starts with the return of above-

freezing temperatures in late winter or early spring and is accelerated by strong offshore winds. All ice disappears between late February in the exposed portion of the south Baltic and by late April in the Gulf of Bothnia. The approximate dates of last ice in this area are given in Figure 7.

The illustrations provide only a general picture of the ice in this area. Local peculiarities and specific dates are presented in Table 8.

SEA SURFACE TEMPERATURE—SALINITY—DENSITY

1-127 GENERAL.—The Baltic Sea is characterized by low salinity and therefore low density, and by large annual variations in sea surface temperatures. The physical characteristics of the surface waters of this region are determined by the excess of precipitation and runoff over evaporation, the prevailing winds, the open connection to the more saline North Sea, and the cover of sea ice.

TEMPERATURE.—The sea surface temperature generally increases southward throughout the year. Because of the continental influence, the mean sea surface temperature varies extensively over the year. It ranges from a maximum greater than 62°F. in the extreme southern part of the Baltic and in the Gulf of Riga during August to a minimum below 32°F. in the Gulf of Bothnia during February.

The surface temperature in the coastal waters tends to be higher in May and lower in November than that of the open sea. For example, during May the surface temperature in the mouth of the Dvina River (Gulf of Riga) is 51°F. The horizontal distribution of mean sea surface temperature is shown for February, May, August, and November in Figures 23 through 26.

SALINITY.—In this area, surface salinity, which is given in parts per thousand (0/00), increases slowly from very low values in the Gulfs of Bothnia and Finland to the south Baltic, then increases sharply westward in the Kattegat as water from the North Sea mixes with the Baltic outflow. In the Gulf of

Riga, salinity decreases southeastward. Values of salinity lower than 3 0/00 and rapid changes over short distances are observed along the coast as a result of river discharge into shallow waters such as those of the Gulf of Riga and the Swedish bays.

Mean sea surface salinity is presented for the months of February, May, August, and November in Figures 27 through 30.

DENSITY.—Density, which is defined here as the specific gravity of sea water, is low throughout this area. It increases slowly from the Gulfs of Bothnia and Finland to the south Baltic, then rapidly westward in the Kattegat. In the Gulf of Riga density decreases southeastward. Ships entering the Baltic Sea from the westward will experience increases in draft because of the considerable decrease of density of sea water.

Since density values vary inversely with those of temperature and parallel those of salinity, they attain a maximum in winter when the temperature is coldest and a minimum in summer when it is warmest. Local variations occur in coastal regions and bays, such as in the Gulf of Riga, as a result of the inflow of lighter river water. Density as low as 1.00000 often is observed in river mouths. The mean distribution of sea surface density for February, May, August, and November is given in Figures 31 through 34. Density is expressed as sigma-t, an abbreviated form wherein water whose density is 1.02450 would have a sigma-t value of 24.50. To convert from a sigma-t value to density, divide by 1,000 and add 1.

BIOLUMINESCENCE (PHOSPHORESCENCE)

1-128 Bioluminescence is the production of light by living organisms. Luminescent displays may be grouped into three general categories: 1) sheet-type, often appearing as a diffuse glow extending over a large area of the sea surface; 2) spark-type, observed as innumerable flickering points of light; and 3) globe-type, appearing as glowing balls of light. The organisms causing these displays include various types of microscopic one-celled organisms called protozoa, minute shrimp-like copepods, and jellyfishes, respectively.

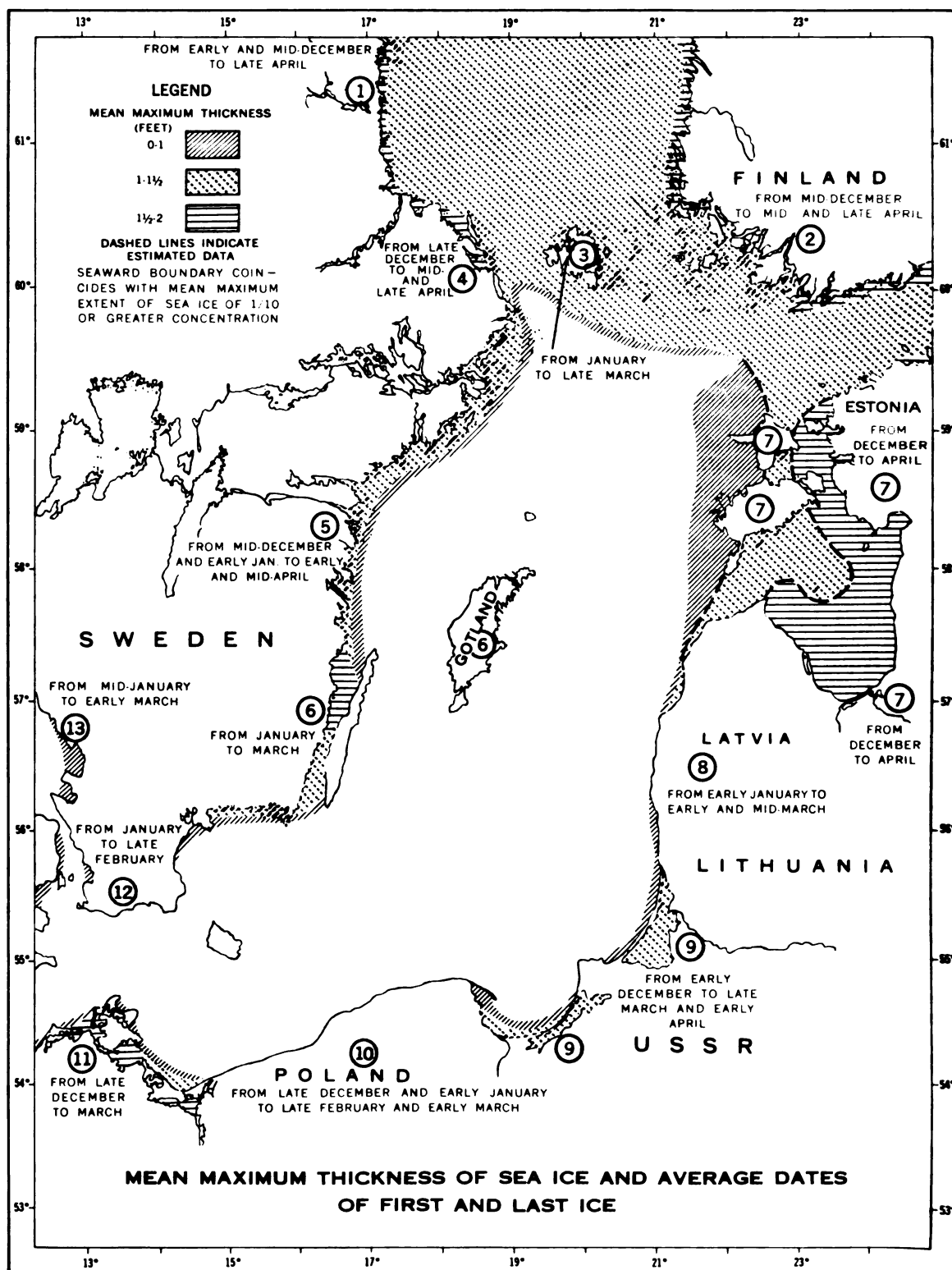


Figure 7



Figure 8

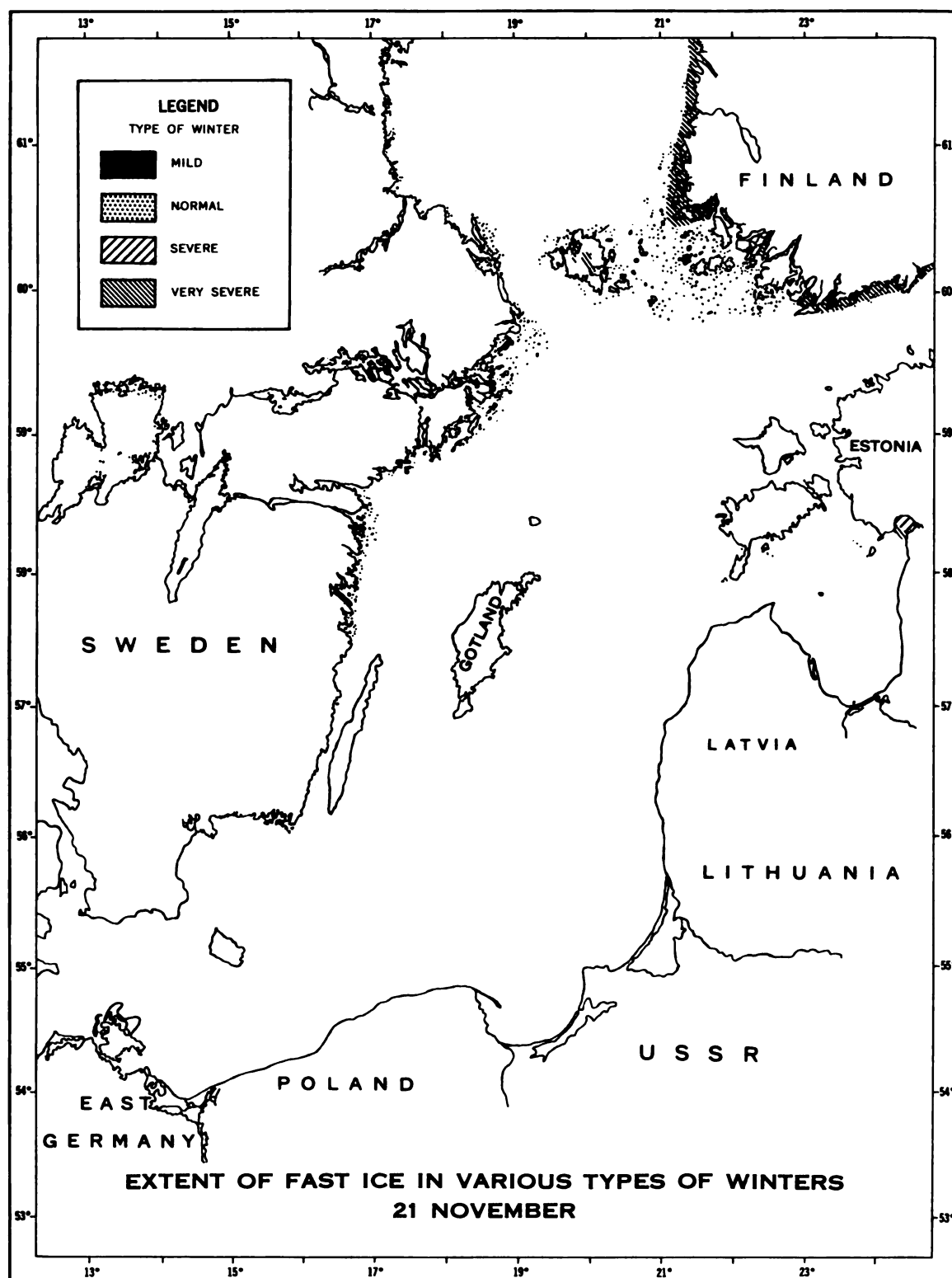


Figure 9

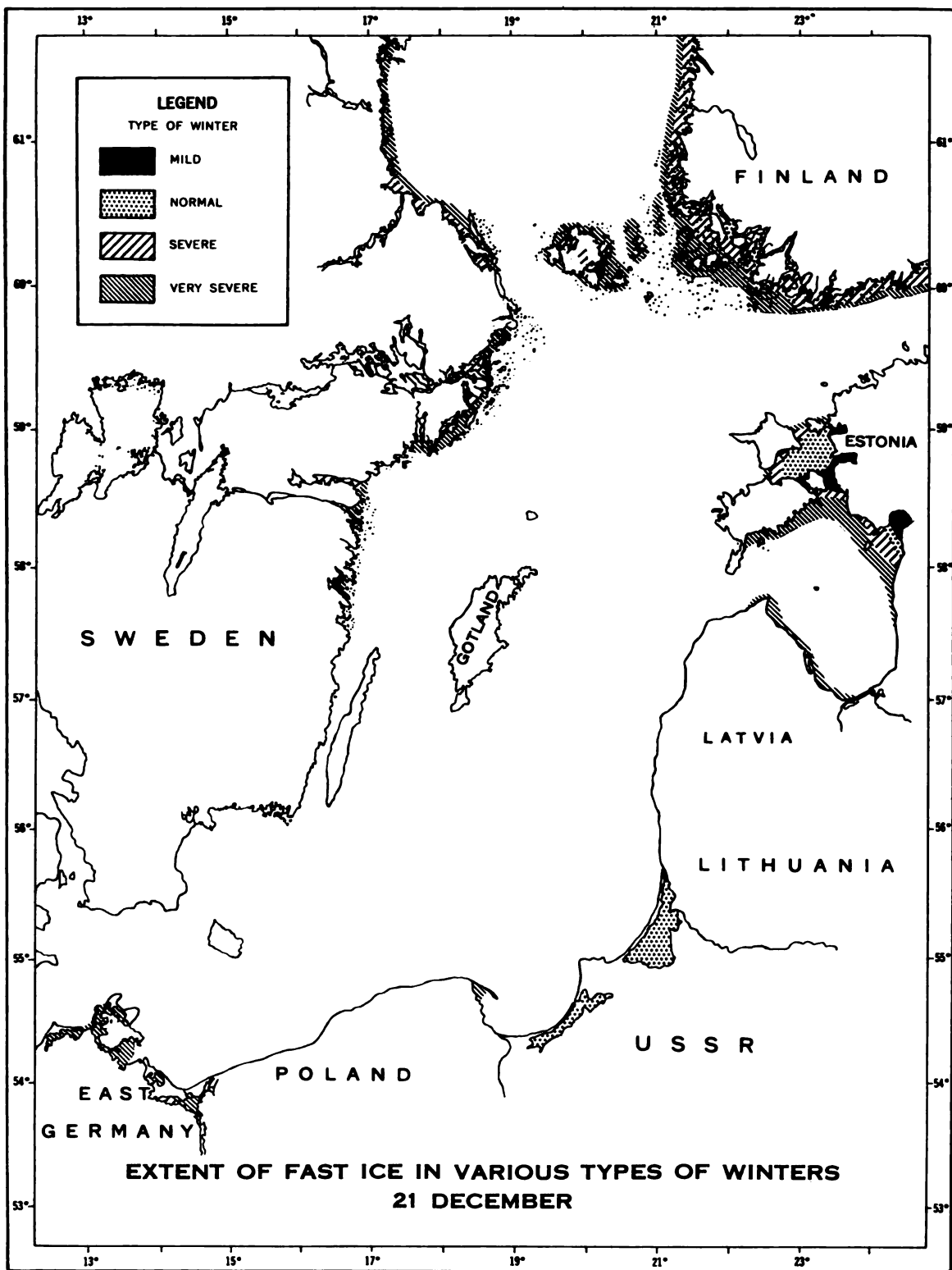


Figure 10

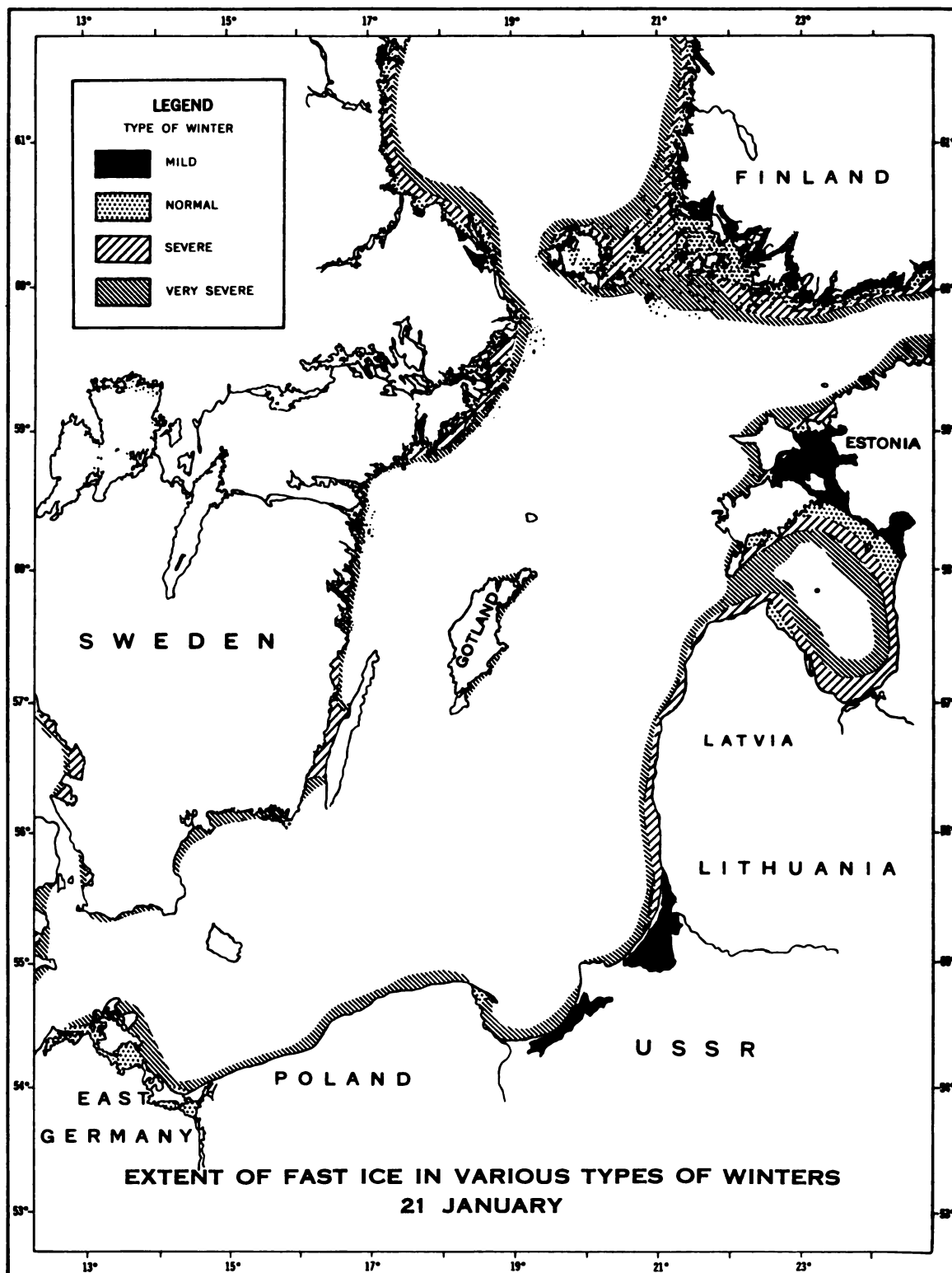


Figure 11

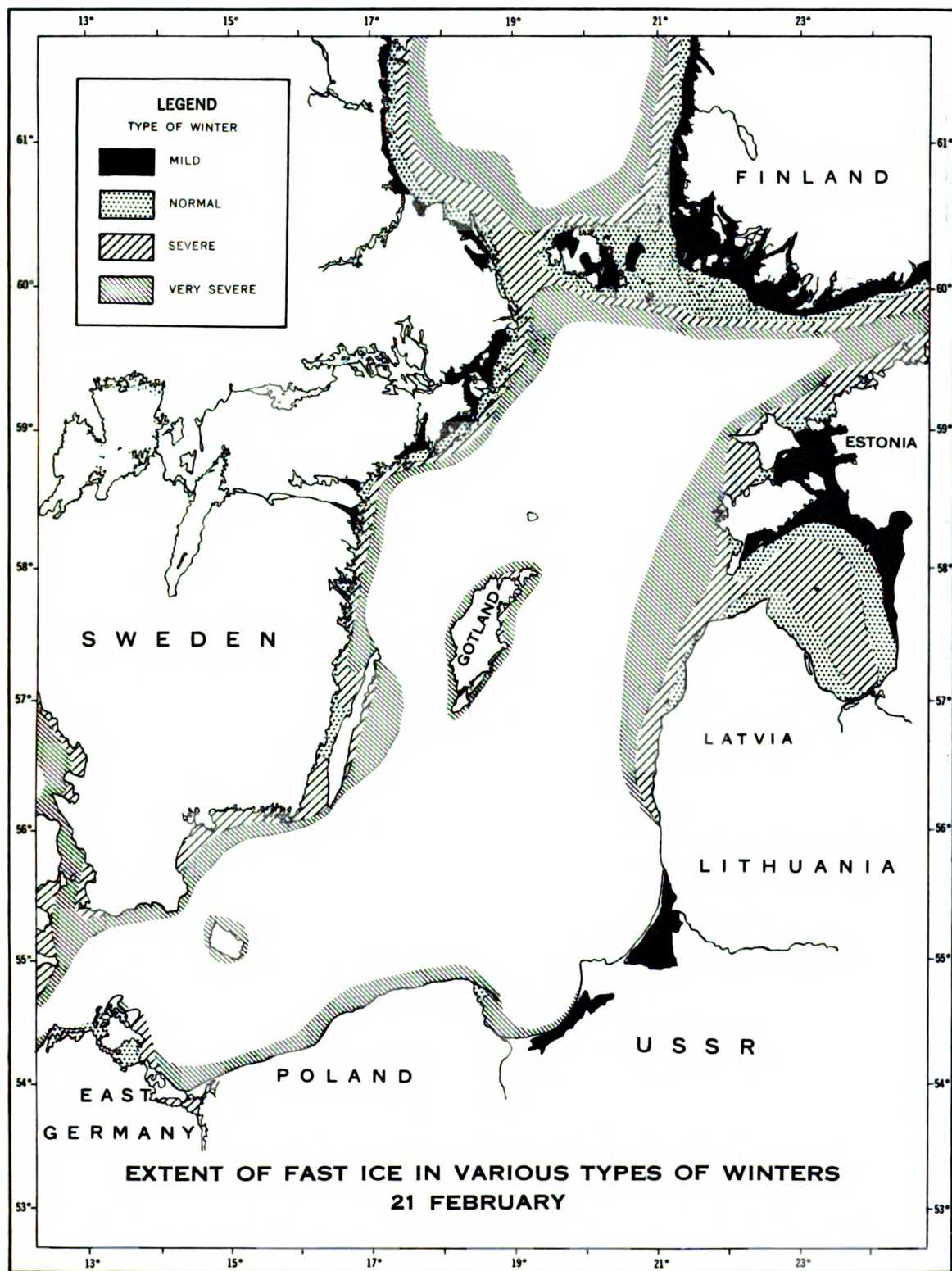


Figure 12

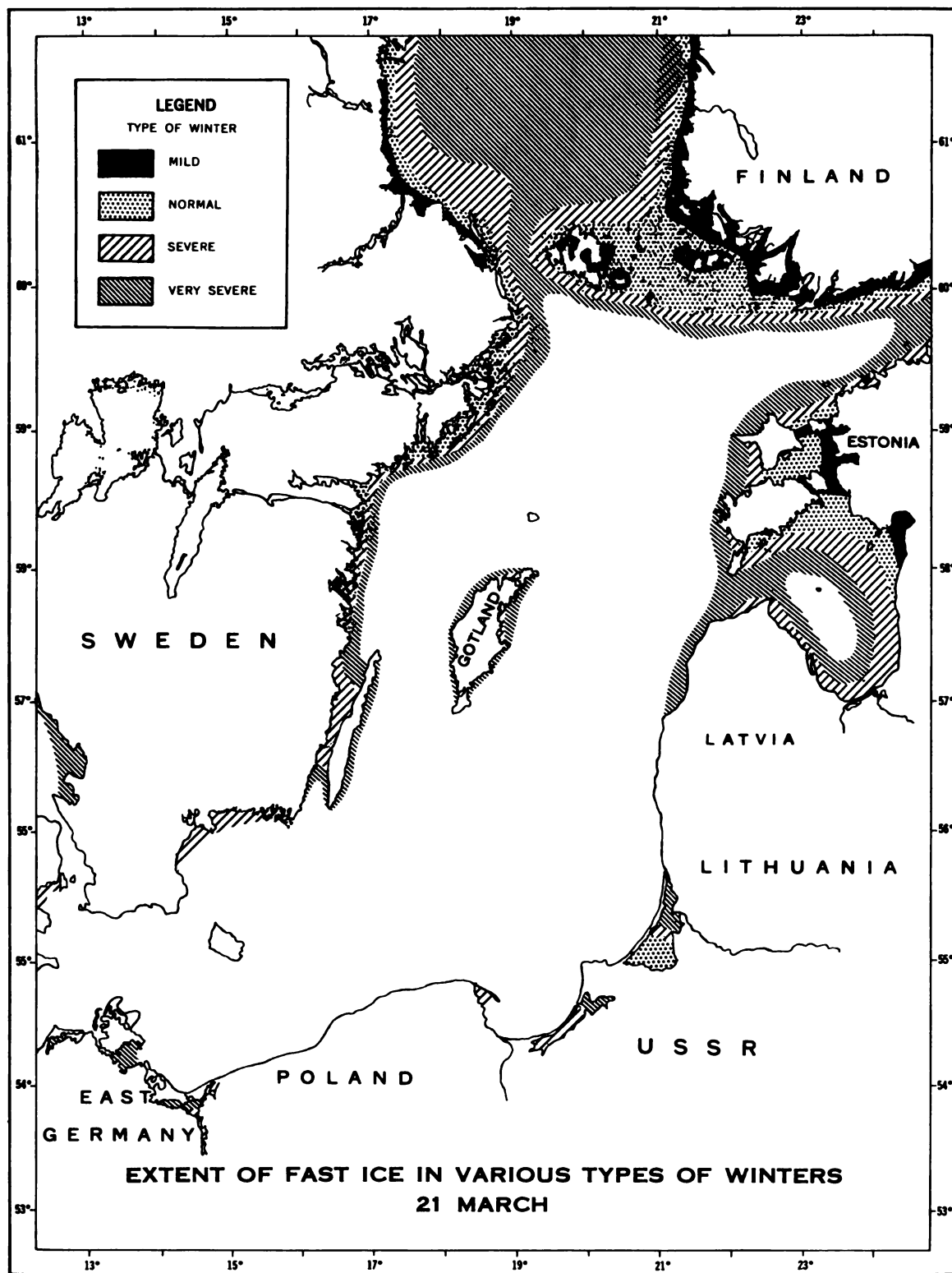


Figure 18

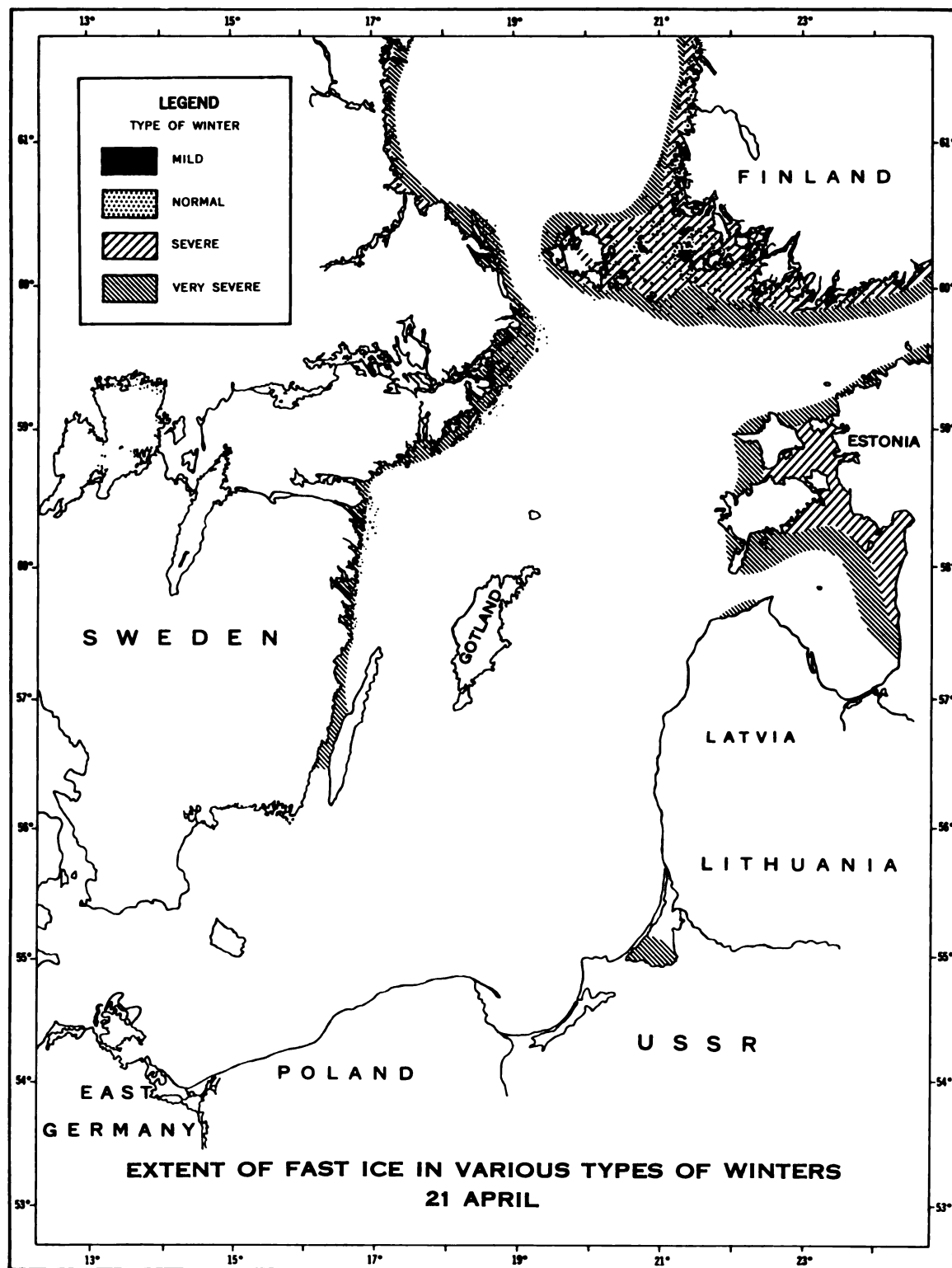


Figure 14

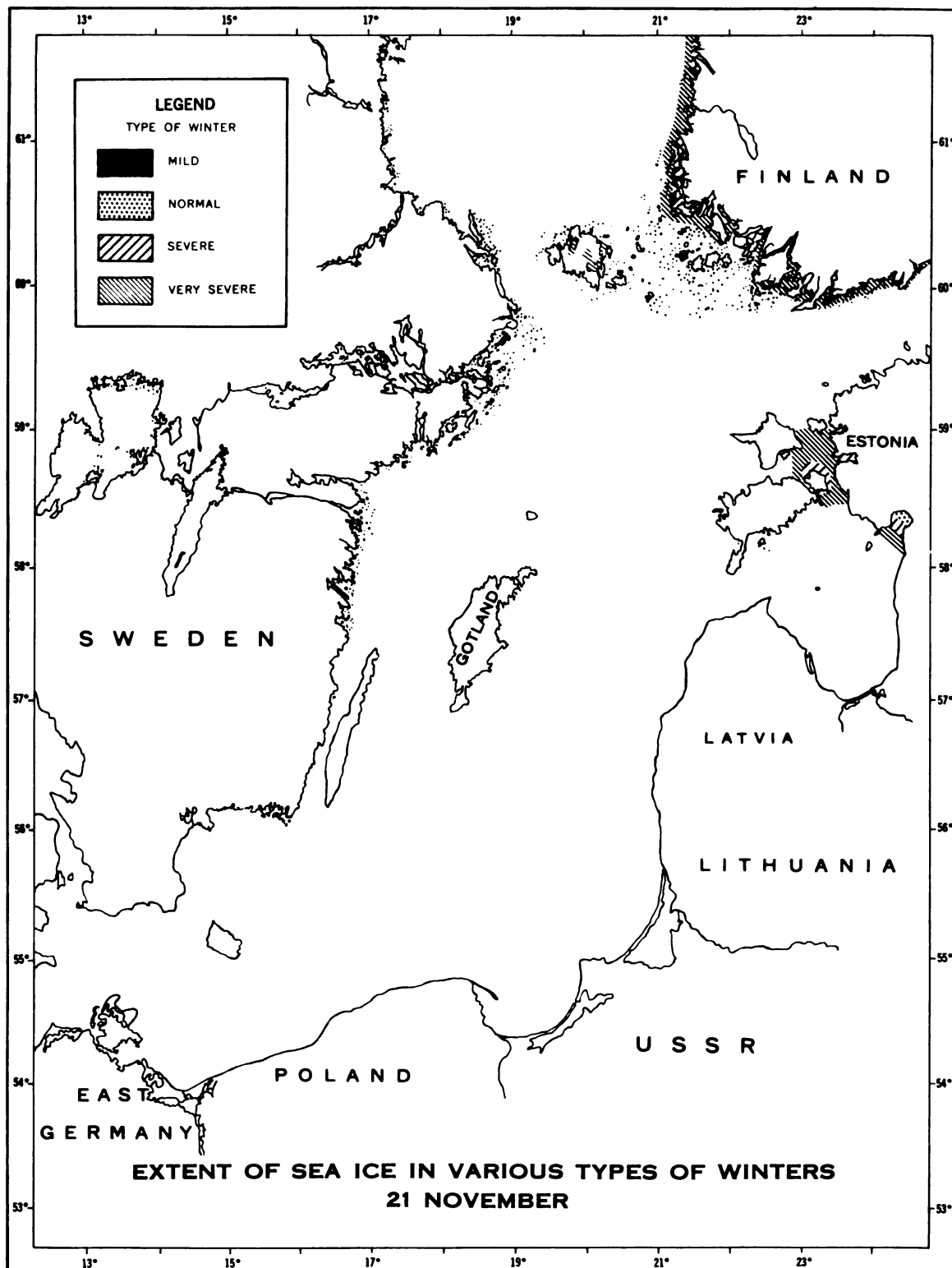


Figure 15

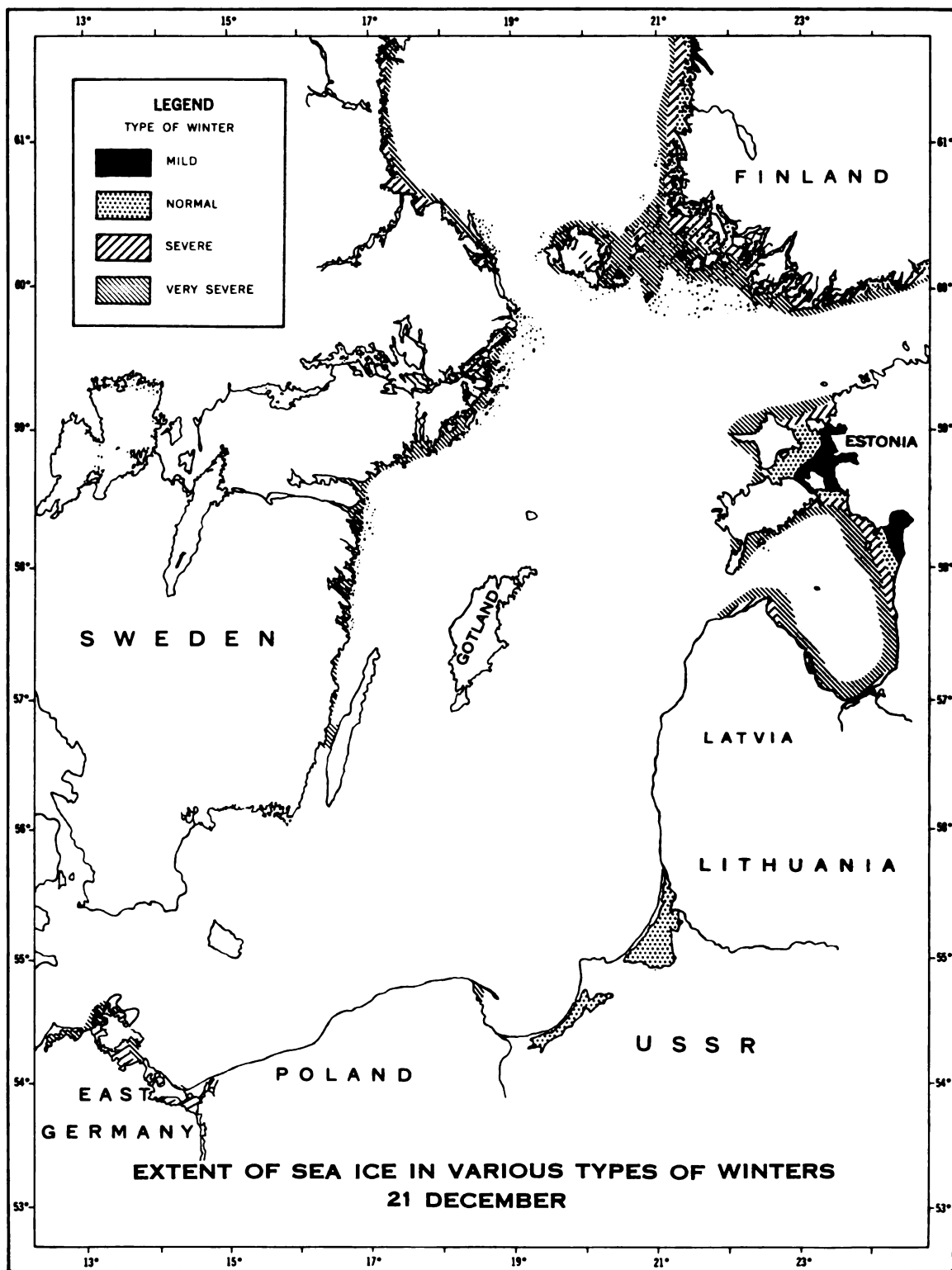


Figure 16

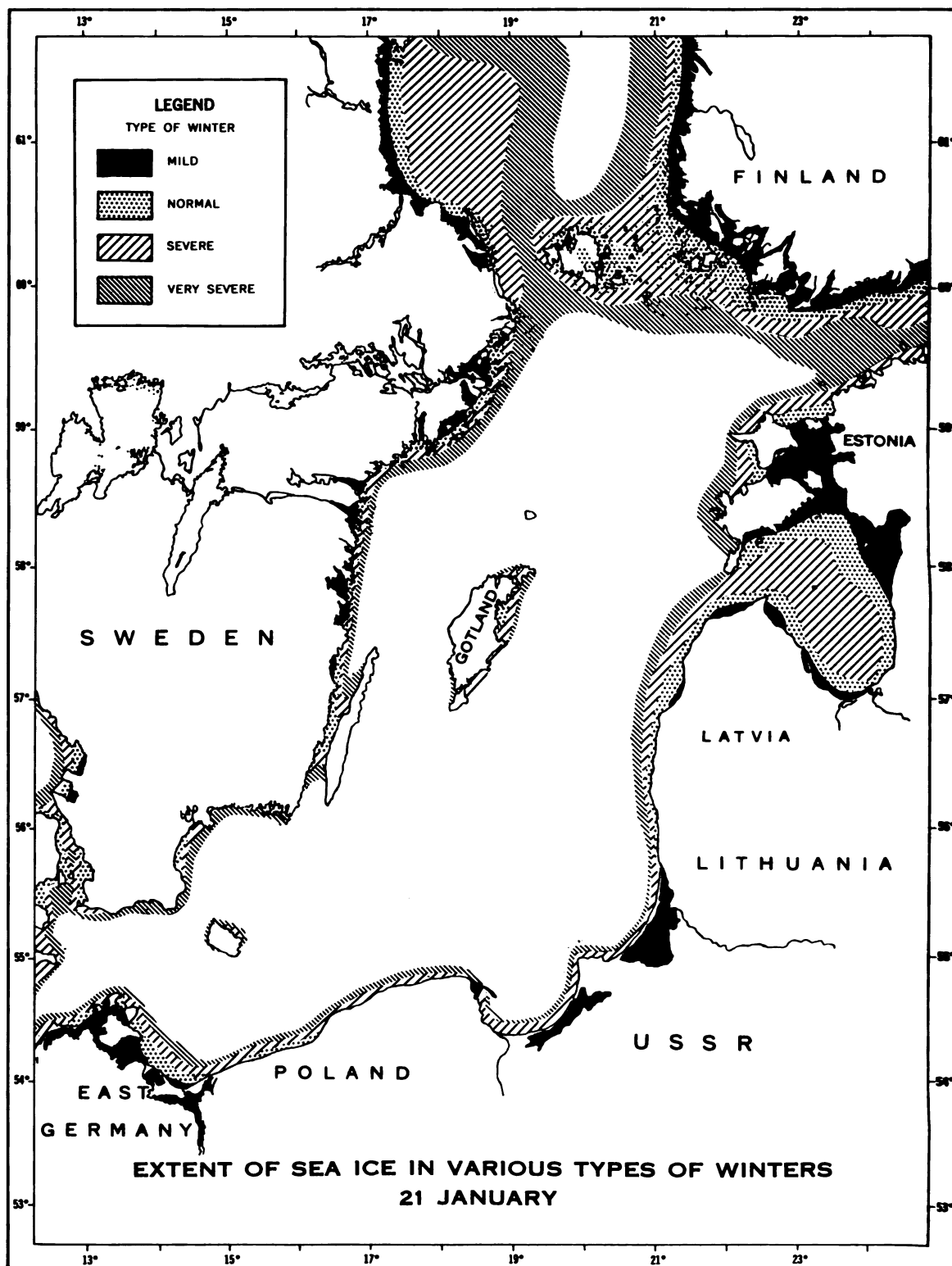


Figure 17

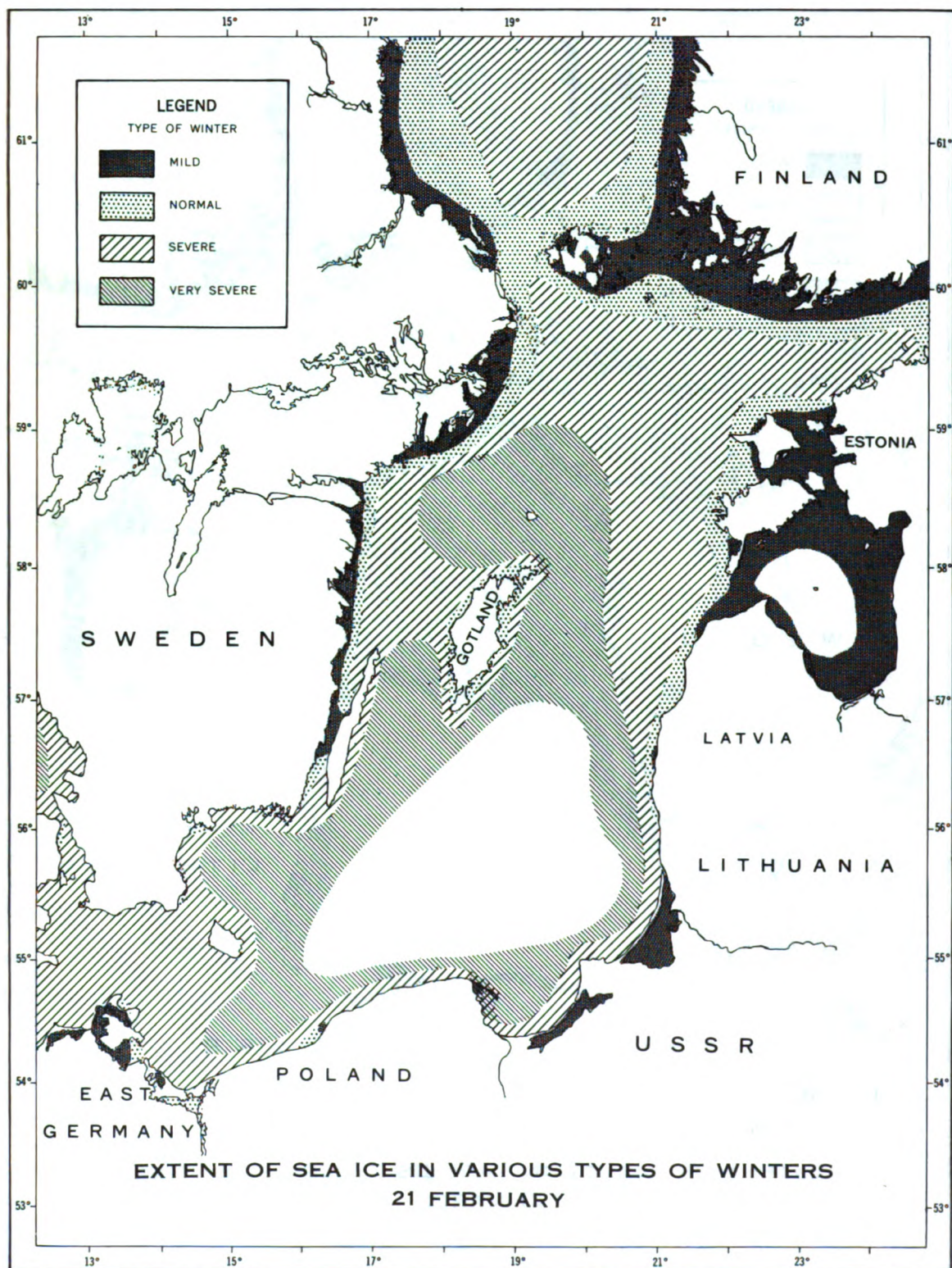


Figure 18

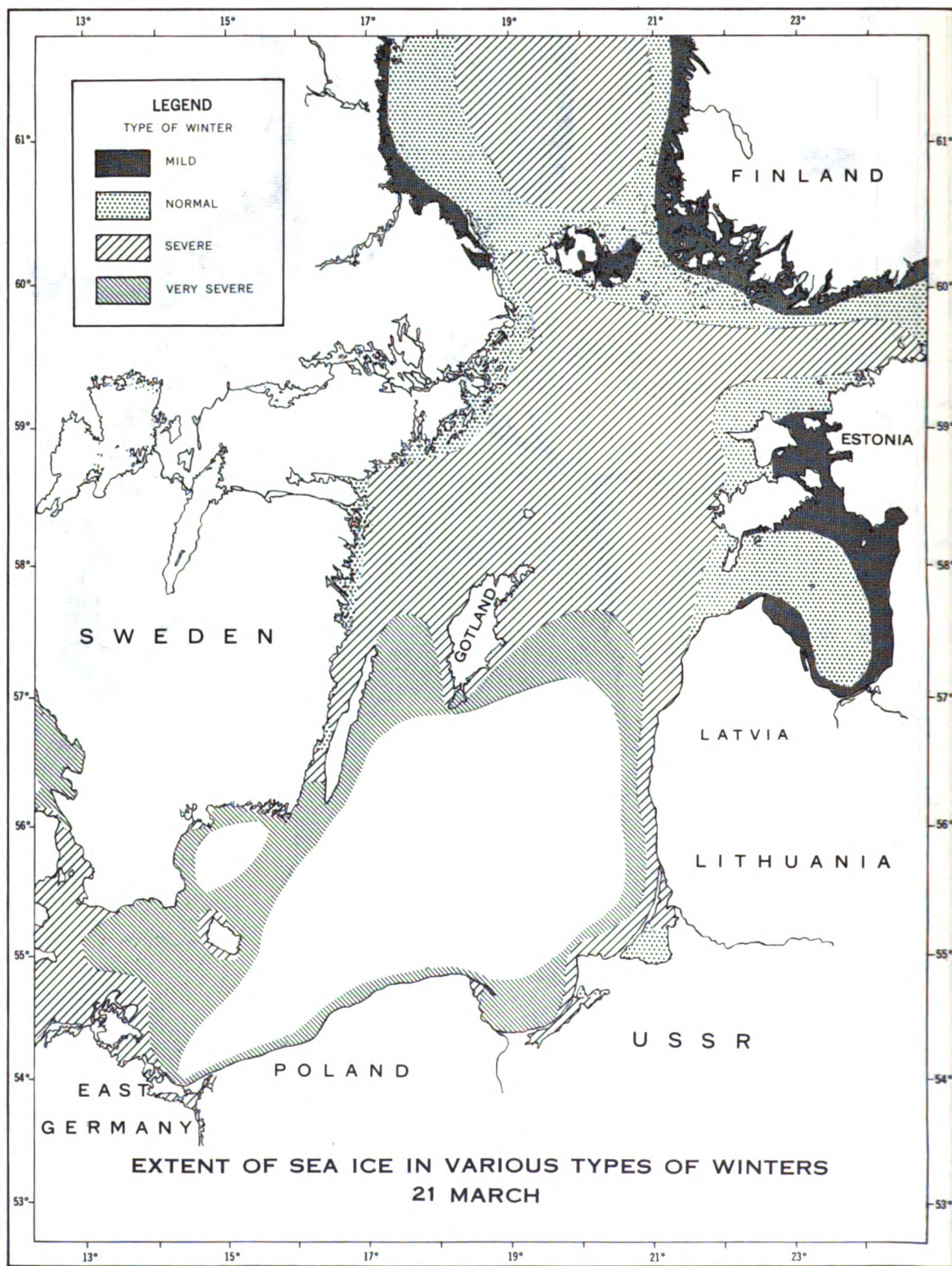


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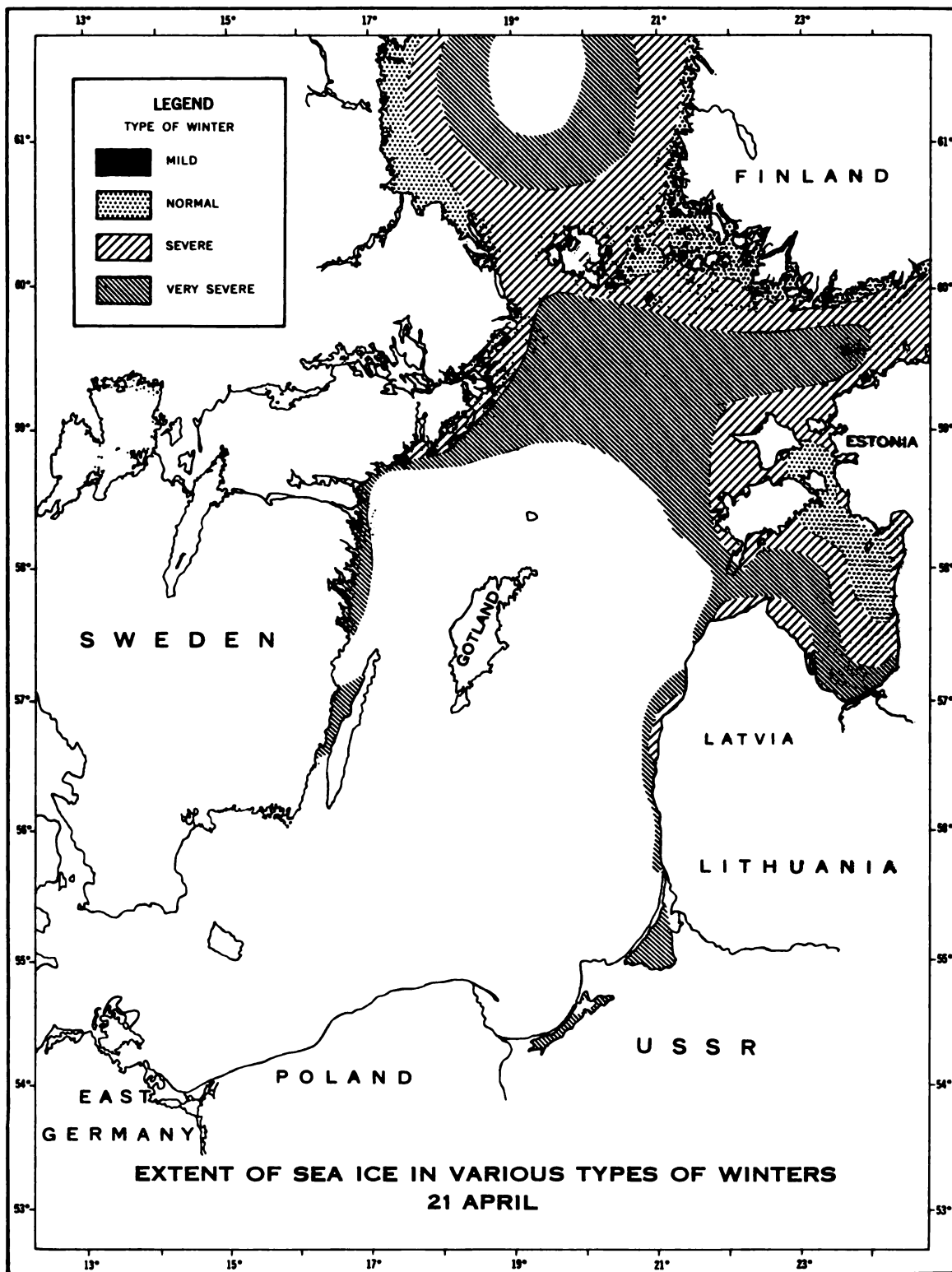


Figure 20



Figure 21



Figure 22

Displays of intense bioluminescence are rare in the Baltic. Occasionally, masses of microscopic bioluminescent protozoa have been reported along the Polish and East German coasts. When these organisms occur in such great numbers, they discolor the water, making it appear red during the day, and create a dull glowing luminescence during the night. This type of bioluminescence occurs most frequently during the spring and autumn months.

Globe-type displays occur during the autumn. These displays are the result of large concentrations of luminescent ctenophores (sea walnuts) and they can be very intense. Some of the displays are bright enough to enable a person to read a newspaper on deck at night.

1-129 MARINE VEGETATION.—Kelp extends into the Baltic Sea to the Gulf of Danzig, Germany (Soviet Zone) and Oland, Sweden. In the entire southern Baltic region the plants are only a fraction of the size of those occurring in the North and Norwegian Seas.

Seagrasses (eelgrass) in the Kattegat and Belts region are as abundant, or in some localities more abundant than marine algae. These marine flowering plants continue to be profuse as far north as the entrance to the Gulf of Bothnia and the western half of the Gulf of Finland. The propellers of small craft have been fouled by becoming entangled in seagrasses in shoal waters of the Belts region. Clogging of sea water intakes by these plants has been reported from the Belts region.

DANGEROUS MARINE ANIMALS

1-130 Very few animals in the Baltic Sea can be considered dangerous to man. There is one jellyfish with a potentially serious sting, two kinds of venomous fishes, one shark of sufficient size to merit respect, and a species of wolffish capable of inflicting a nasty bite. All of these animals are restricted to the western portion of the Baltic, and none is at all common in this region.

The jellyfish is a large yellow-orange medusa called the lion's mane. This powerful stinger occasionally enters the Baltic in late summer or early autumn. The venomous fishes are the stingray, a flattened kiteshaped

animal bearing one or more large serrate spines near the base of its long slender tail, and the weeverfish, a small perchlike fish with stinging spines. Both are bottom dwelling creatures with the habit of burying in the mud or sand, thus presenting a threat to waders. The only large potentially dangerous shark recorded from the Baltic is the blue shark, a species regarded by some authorities as one of the least likely to attack man. This shark is reported to enter the Baltic in summer. The wolffish is an elongate fish with massive head and jaws. When taken from the water, the wolffish snaps savagely at anything within reach.

SEISMIC DISTURBANCES

1-131 Strong earthquakes rarely occur in this region. However, numerous local shocks perceptible only to sensitive instruments have been reported periodically. These small local shocks apparently are associated with the isostatic adjustment of the Baltic Shield, which has been slowly rising since the load of the glacial ice was removed by melting at the end of the Pleistocene period. Some of these shocks may be felt aboard ships close to the epicenters.

There are no volcanoes in the region. However, ash falls caused by volcanic activity in Iceland have been reported on several occasions.

CLIMATOLOGY*

GENERAL

1-132 The location of the Baltic Sea between the Atlantic Ocean and the Eurasian continent is to a great extent the determining factor of the climatology of the area. During periods of strong westerly flow, the marine influence of the warm eastern North Atlantic is felt throughout the region. On the other hand, during easterly flow and anticyclonic control, the weather often takes on strong continental characteristics.

The westerly, cyclonic flow, which brings mild and moist maritime air in from the

* Prepared by the Environmental Data Service, Environmental Science Service Administration, Department of Commerce.

Atlantic, is the dominant climatic control during all seasons, except perhaps late spring and early summer when continental influences are the strongest. Nevertheless, there is a fairly large variation in the weather of the individual years caused by abnormalities in the position and strength of the semipermanent pressure systems.

PRESSURE

The southern Baltic lies along the eastern fringes of the two large semi-permanent centers of action in the North Atlantic, the Icelandic low and the Azores high. Autumn and winter months, on the average, find the area within the cyclonic circulation of the extensive Icelandic low. As spring progresses into summer, the Icelandic low weakens steadily and the circulation around it has a lesser effect on the climate of the Baltic. Another influence on winds and weather over the southern Baltic arises from the seasonal change of pressure over the large continental areas to the eastward from high pressure during the cold season (Siberian High) to relatively lower pressure in summer.

These pressure systems are average features and are by no means permanent. Frequently, especially during the winter and spring seasons, large high pressure systems of extensive vertical development traverse northern Europe, often from eastward to westward and often remaining quasi-stationary for a week or so. During such periods the normal pressure pattern is completely reversed over western Europe and the eastern North Atlantic, with high pressure covering northern areas from Scandinavia to Iceland and low pressure the lower middle latitudes from the Mediterranean to the Azores. During such years the Baltic, and Europe in general, comes under prolonged periods of continental influences, resulting in severe cold during the winter months. Sea level pressure during the passage of such so-called blocking highs has on occasion risen to 1050 mb., or above, over the southern Baltic. One such case occurred on December 24, 1962. The highest value recorded in this century over the southern Baltic occurred on January 23, 1907 when the barometer registered approximately 1065 mb. at many stations.

Migratory low pressure systems cross the region during all months of the year with the average greatest frequency and largest and deepest development during late autumn and winter. These traveling depressions usually move from westerly quadrants passing through the region on paths toward directions between southeast and north at a forward speed of 15 to 20 knots. At times of strong vertical development these lows can remain stationary for several days, while at other times a low may move swiftly through the area at 30 to 40 knots. The central pressure of very intense lows may drop below 950 mb. Two deep cyclones with 950 mb. Central pressure crossed from central Sweden to the Gulf of Riga on February 13 and 17, 1962. Whole gale to occasional hurricane force winds associated with the latter of the above mentioned lows caused tremendous damage along the German North Sea Coast, including Hamburg.

Cyclogenesis frequently occurs over the waters southward of Norway as secondary depressions form along cold and occluded fronts reaching the mountain barriers of the Scandinavian Peninsula. Rapid pressure falls are often associated with these so-called Skagerrak lows as the developing cyclone moves eastward across the Baltic.

For additional pressure data see appendix tables.

WINDS

1-133 Winds are quite variable over the Baltic throughout the year, though winds from westerly quadrants have a strong predominance, particularly during autumn and winter. Spring and early summer have a high frequency of easterly winds, and in late spring, when anticyclonic control is the strongest, easterly and northeasterly winds are prevalent at many locations.

In spring and summer from about April to September, land and sea breezes often develop in coastal regions. The sea breeze usually sets in about 1000 local time on sunny days with weak pressure gradients and disappears toward evening. Land breezes, though usually weaker, are felt during the nighttime hours. In many cases, the sea and land breeze effect may not result in a re-



Figure 23

Figure 24



Figure 24



Figure 25

Figure 26

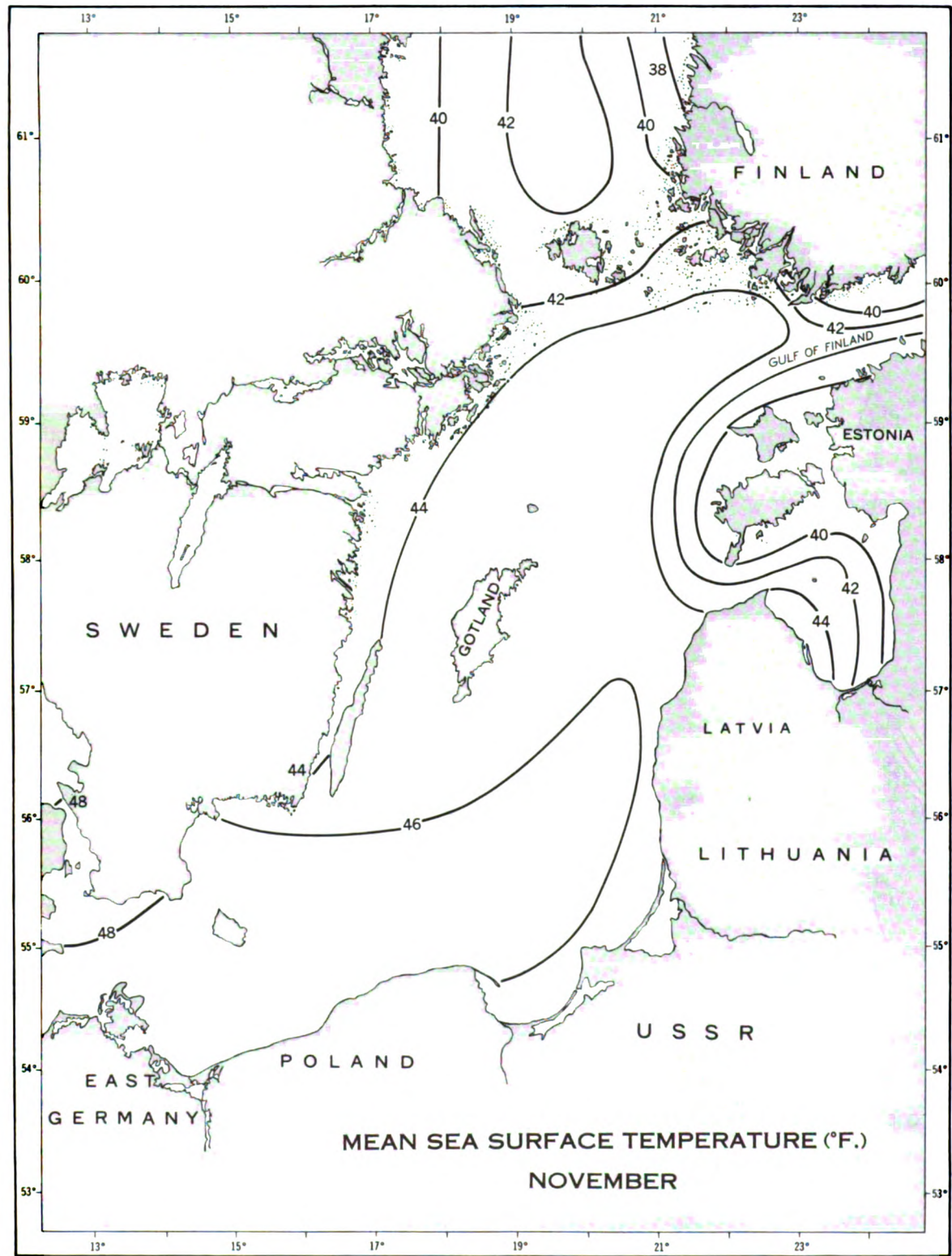


Figure 26

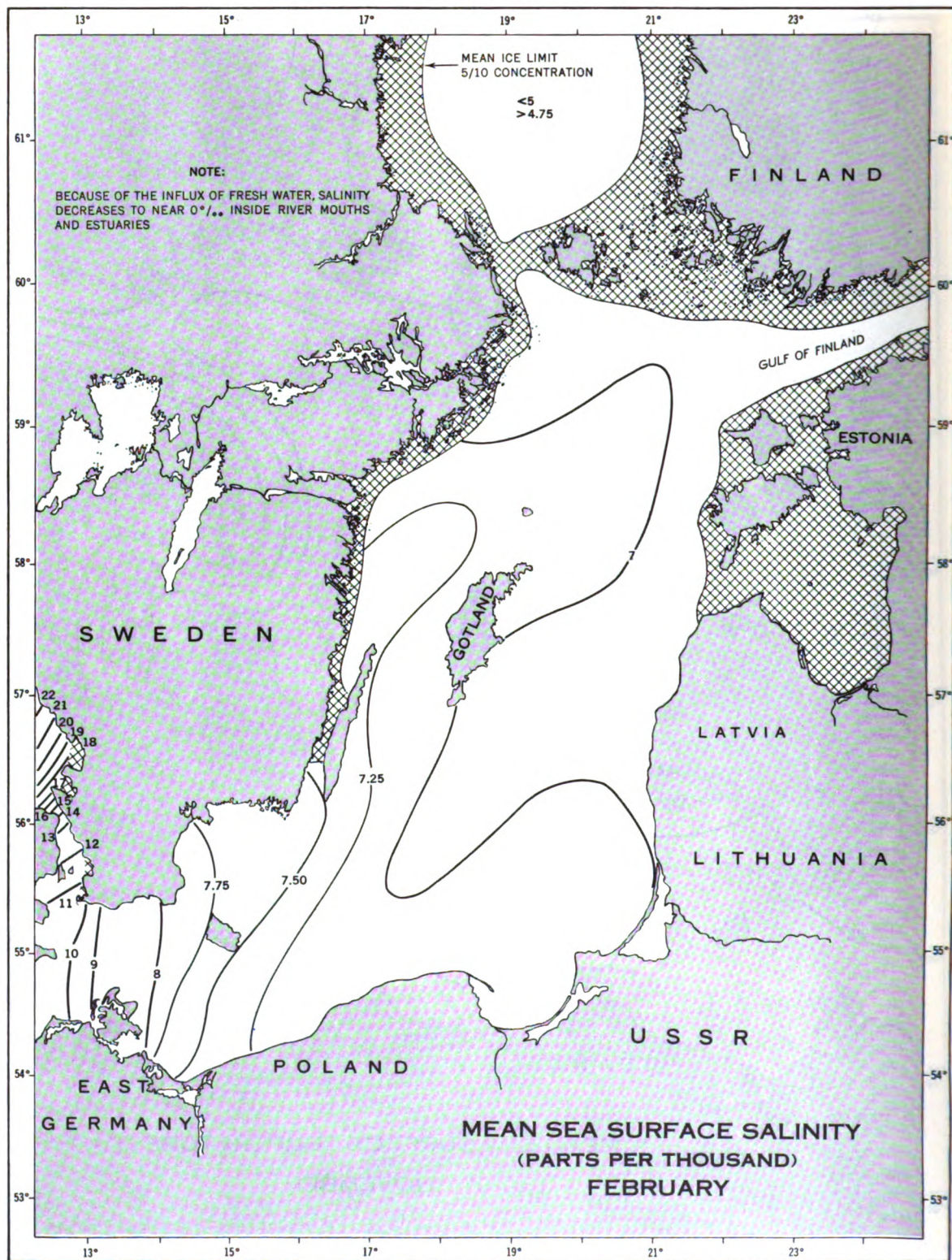


Figure 27



Figure 28

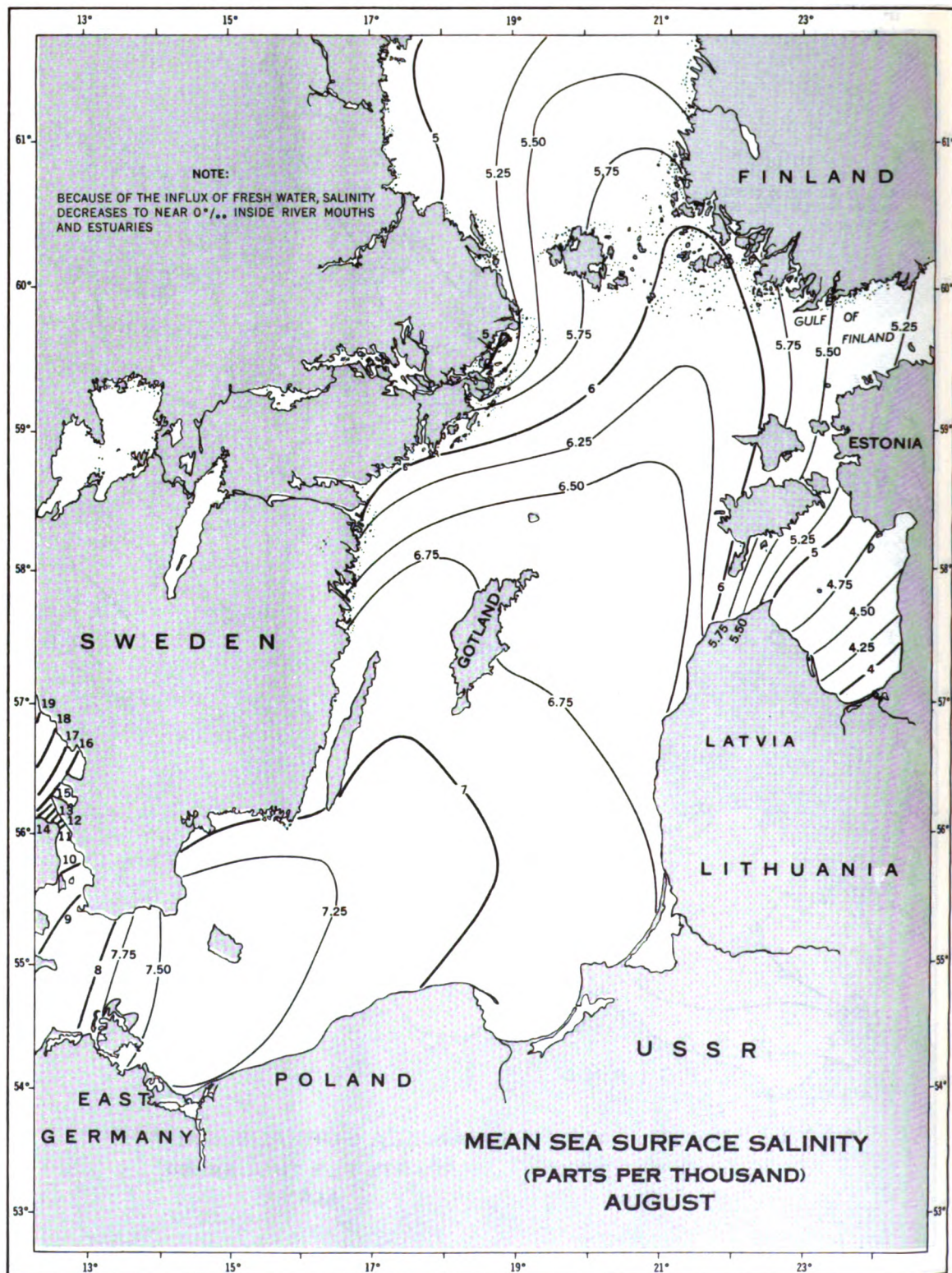


Figure 29

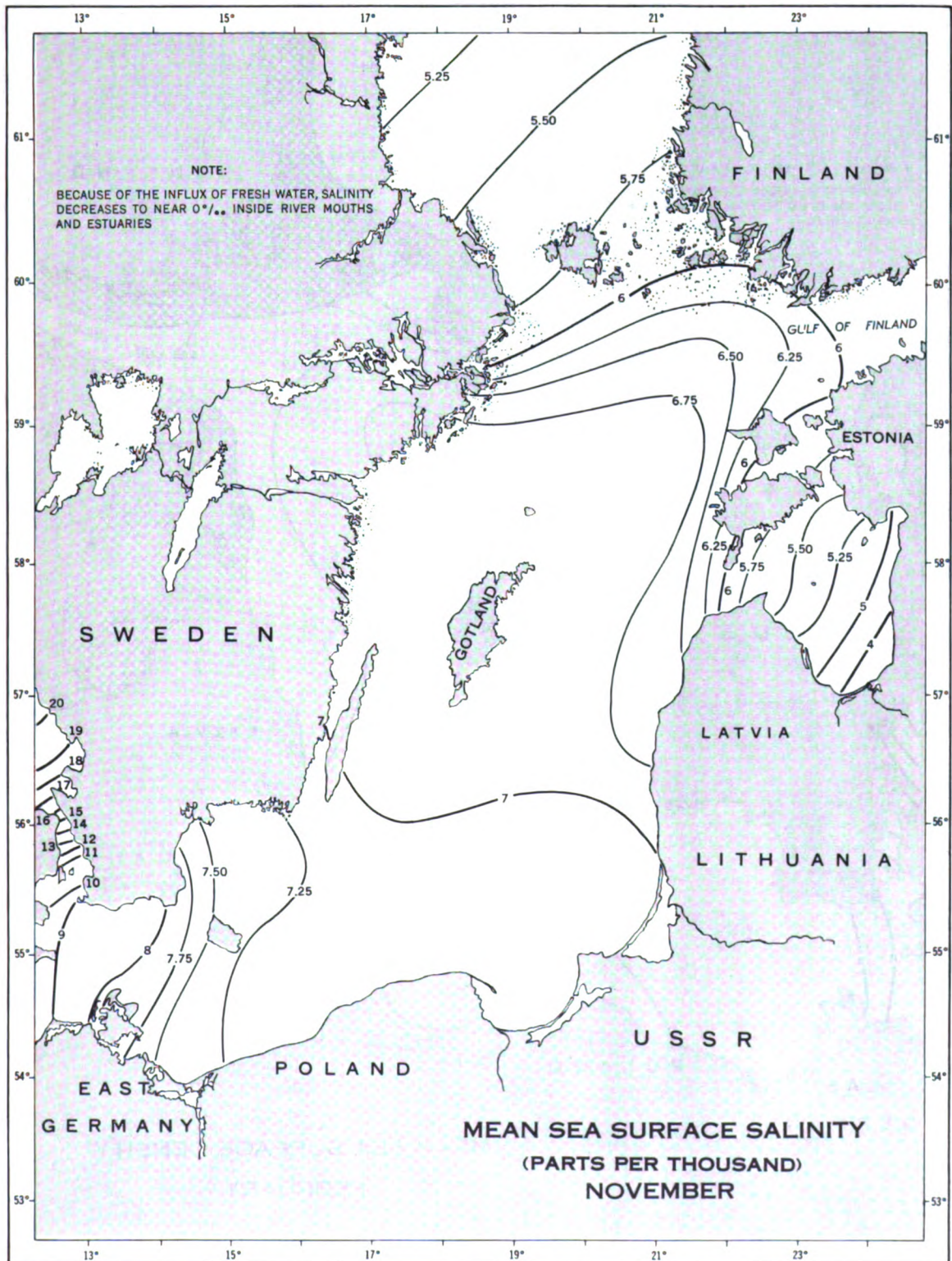


Figure 30

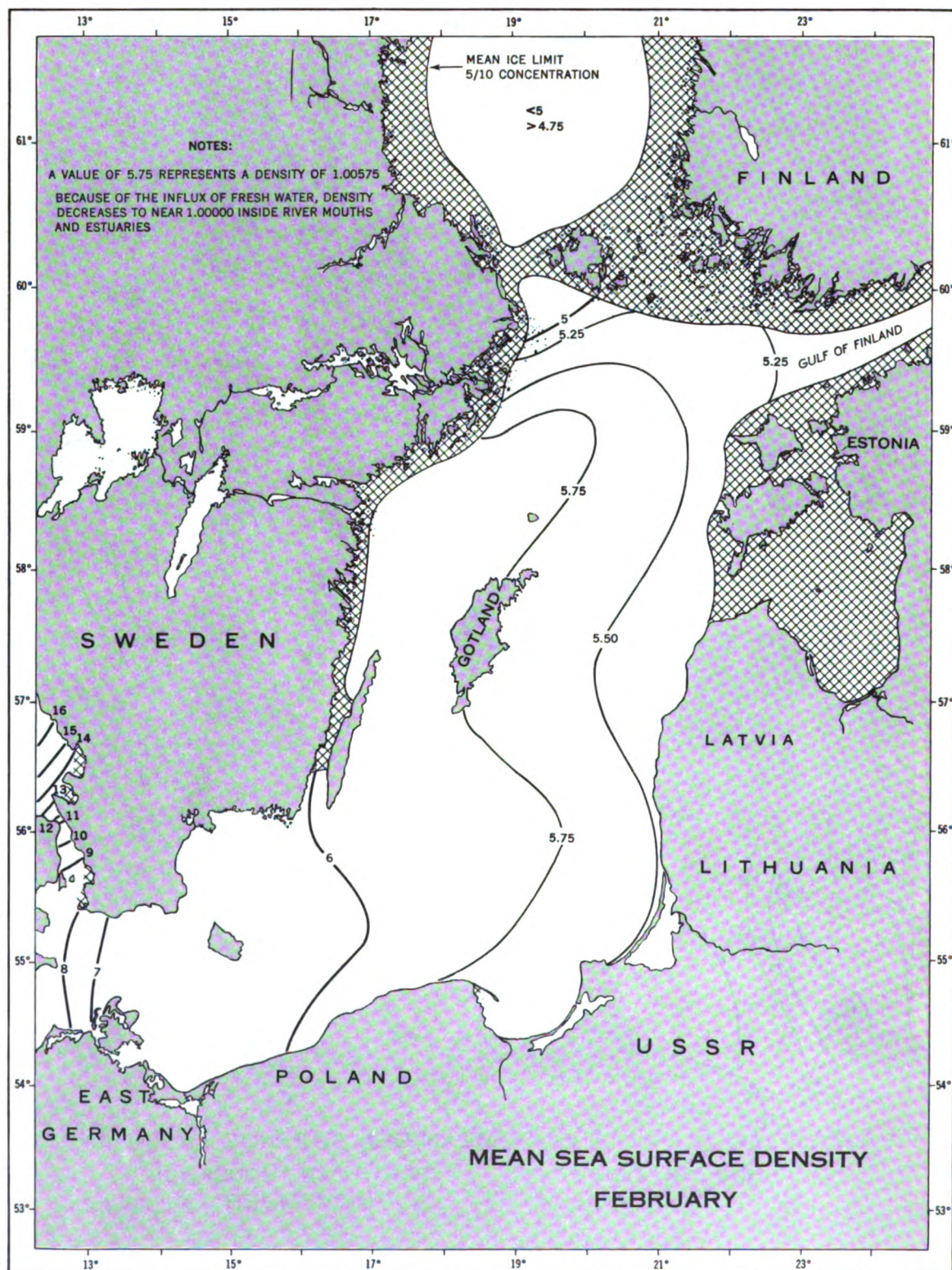


Figure 31

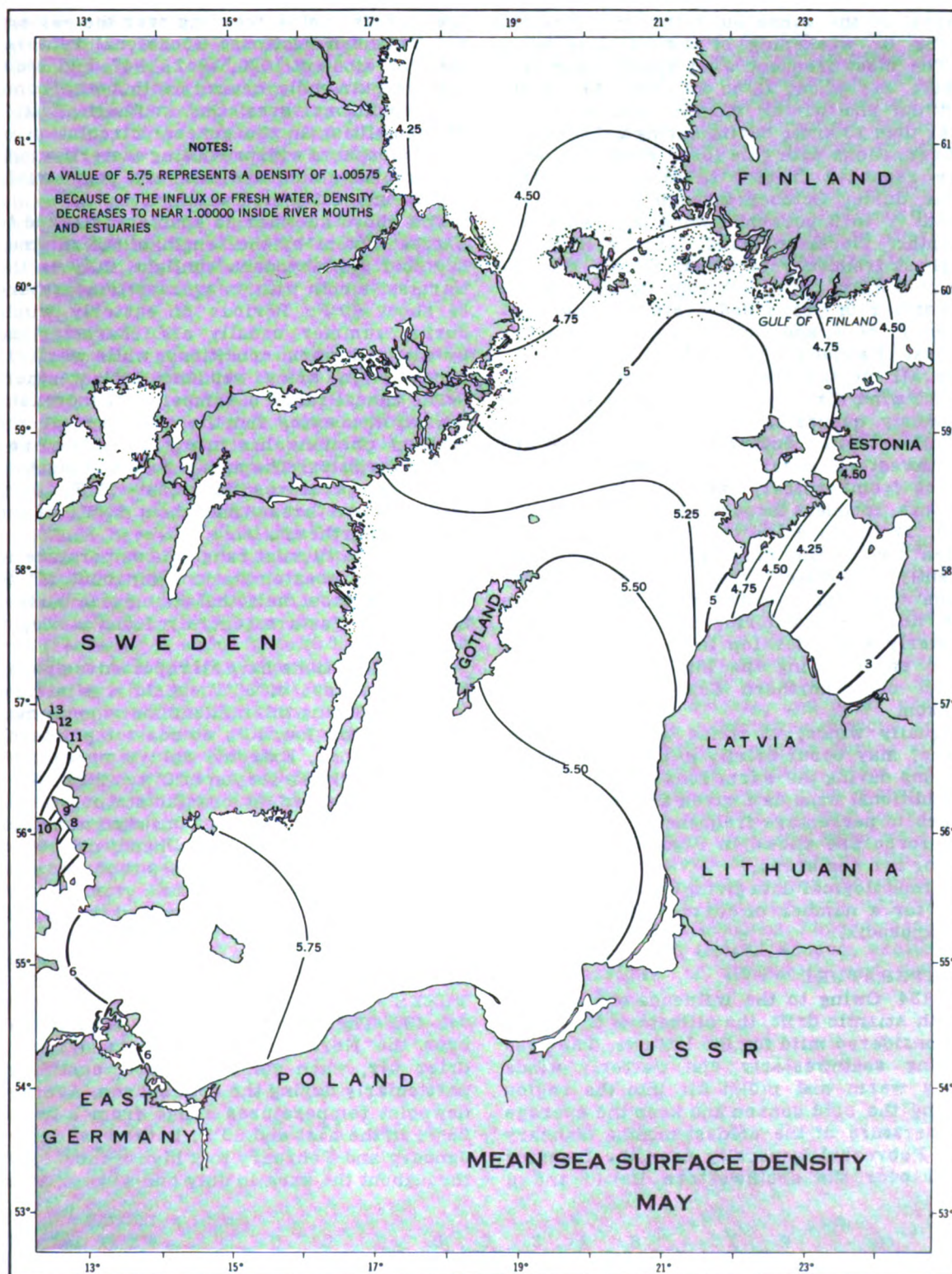


Figure 32

versal of the winds but rather in a strengthening or weakening of the existing wind.

The most frequent wind speeds over open water are about 15 to 20 knots during the autumn and winter months, and generally less than 10 knots during spring and summer. Observations with gale force winds (≥ 34 kt.) are recorded from 5 to 10 percent of the time during October through February and about 1 to 3 percent during the remaining months. December and January have the highest frequency of gales, almost 10 percent in many areas, although October during a number of years had a similar high frequency. May and June generally have the lowest of about one percent.

In all months, except May, the most frequent wind directions during gales are from westerly quadrants with a tendency toward southwesterlies during the cold season and northwesterlies during the warmer months. Gales from easterly directions are, nevertheless, frequent throughout the stormy season. The rare gales that occur in May are often out of the northeast. They are frequently associated with low pressure systems traveling northward to Poland from the Adriatic Sea during spring, and northeasterly gales develop in their circulations upon encountering the high pressure often found over northern Scandinavia in this season.

Squally winds, at times gusting to gale force, may occur briefly in severe thunderstorms during the warm season.

Additional wind data given as monthly wind roses of percentage frequencies of direction and force are shown in Figures 36 through 41 for two sea areas.

Climatological data giving similar information for a number of coastal stations are in the appendix.

TEMPERATURE

1-134 Owing to the influence of the warm North Atlantic drift, the climate of the Baltic is considered mild for the latitude. The prevailing southwesterly and westerly winds bring warm and moist air into the region during the cold season and keep the average temperature of the coldest months (January and February) generally near the freezing level over the southwestern Baltic and a

few degrees below freezing over the eastern and northern sections. Occasional winters, such as those of 1929, 1942, 1947, and 1963, can be extremely severe, with bothersome ice conditions over the southern Baltic. Abnormalities in the general circulation of the atmosphere with prevailing easterly winds off the Eurasian continent are responsible for the unusually cold weather.

The short summer is counter-balanced to a great extent by the length of the summer day and its abundant sunlight. July is the warmest month with an average temperature of about 60°F. Periods of easterly winds during summer usually are characterized by dry and warm conditions, while westerly winds often bring wet and cool weather.

The annual range of temperature increases toward the east, and the climate over the eastern portions has many continental characteristics. The annual range of monthly mean temperatures is about 27°F. over southwestern areas and about 35°F. in the extreme northeast.

The mean diurnal range of temperature in summer at coastal stations is about 10° to 15°F. and about half that amount in winter. Smaller ranges are generally found over open water.

Coastal stations have all reported temperatures in excess of 85°F. in July. Minimum readings during this midsummer month may drop into the low 40's at coastal points on cool mornings. Extreme cold temperatures during the winter season of 0° to -20°F. have been experienced at coastal stations along the southern and eastern coast and along the Swedish coast. On the other hand, mild temperatures near 50°F. have been recorded even in January.

For additional data on temperatures see tables in the appendix.

HUMIDITY AND DEW POINT TEMPERATURES

1-135 The air over the Baltic is drier than over the North Sea, and this trend toward drier air, when going eastward, continues, particularly during the cold season. Average dewpoint temperatures range from a low of 25°F. in the east and 30°F. in the west during January and February to a high of about 58°F. throughout the area in July and August. Per-

centages of average relative humidities over open water are in the upper 80's and low 90's during the coldest hours of the day throughout the year ranging down to percentages in the 70's on late spring and summer afternoons. Late autumn and the winter months have consistently higher relative humidities. Occasional summer days, particular in advance of thunderstorm activity, have rather humid conditions for the region with dewpoints in the 65° to 70°F. range.

For additional data on relative humidity see tables in the appendix.

PRECIPITATION

1-136 The average annual precipitation totals for the southern Baltic range between 15 and 30 inches. The majority of it falls during midsummer and autumn while late winter and early spring are the driest seasons. The greatest frequency of precipitation is in early winter with an average of about 20 days with precipitation in December. May and June have the smallest frequency when it rains on about 10 days per month.

Snow is most frequent over the eastern areas where it falls on an average of 40 to 50 days per year. Over western portions the frequency is about 25 to 30 days per year. Snowfall is often light, and early and late season snows frequently melt on touching the ground. Occasionally heavy snow may fall. The great majority of the snow falls from December through March.

Thunderstorms over coastal areas occur on the average of 2 to 4 days per month from May through August with occasional cases in September, October, and April. Thunderstorms during the winter months are rare. In summer, thunderstorms develop mostly over land in the afternoon or evening. Thunderstorms over open water are less frequent during the early season and are usually associated with passages of cold fronts and depressions.

For additional monthly precipitation data see appendix tables.

CLOUDINESS

1-137 A moderate degree of cloudiness prevails over the southern Baltic throughout the year. There is, nevertheless, a distinct minimum of about five-tenths coverage during late spring and in summer. Maximum cloud cover of about eight-tenths occurs in late autumn and early winter.

Cloudiness is fairly evenly distributed throughout the area. In coastal waters during the spring and summer season there is generally a decrease in cloudiness from land toward the open sea while the opposite holds true for late autumn and the winter months.

The diurnal change in cloud amounts is rather small over open water through considerable variation is experienced over land areas on summer days with maximum during the afternoon hours.

For additional monthly cloud data see appendix tables.

VISIBILITY

1-138 The winter and spring months have the highest frequency of low visibility over the southern Baltic. During June some improvement occurs with generally good conditions prevailing during the summer and autumn months. In late autumn visibility deteriorates again. Fog over open waters is most frequent from winter through early summer, though low cloudiness, drizzle, and other precipitation also are restricting factors to the range of visibility - mainly during autumn and winter months. Arctic steam fog occasionally occurs over open water when bitter cold air moves from land to sea. The frequency of fog over the open waters of much of the southern Baltic is illustrated in the following table giving the number of days per month that fog was reported at two small island locations. These two islands, Christianso and Gotska Sandon, are located northeastward of Bornholm and Gotland, respectively.

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Christianso 55.3°N., 15.2°E.	5	7	7	6	5	2	2	1	1	3	1	4	44
Gotska Sandon 58.4°N., 19.2°E.	3	3	5	6	5	3	3	2	3	4	2	2	41

For additional monthly visibility data see appendix tables.

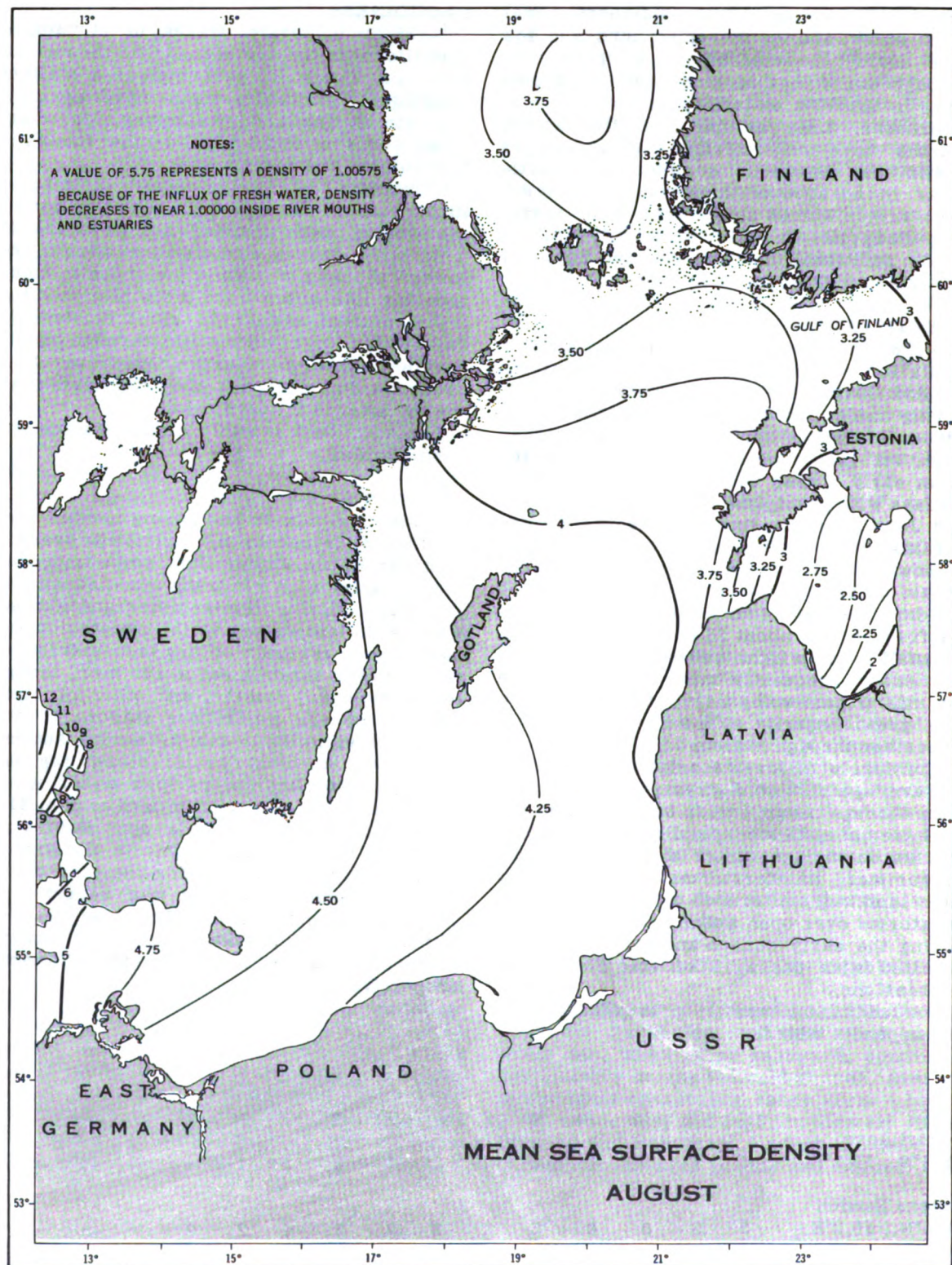


Figure 33

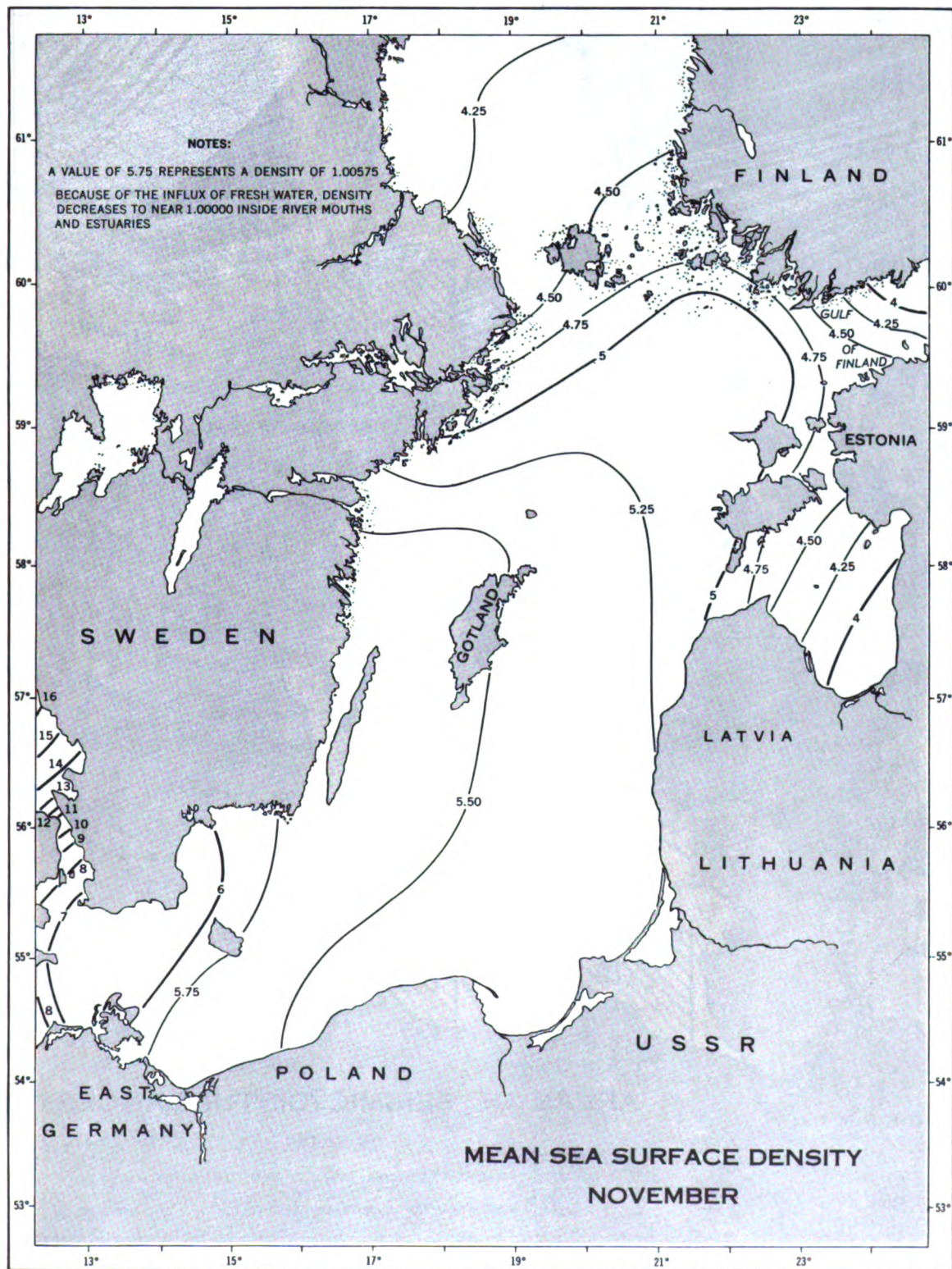


Figure 34

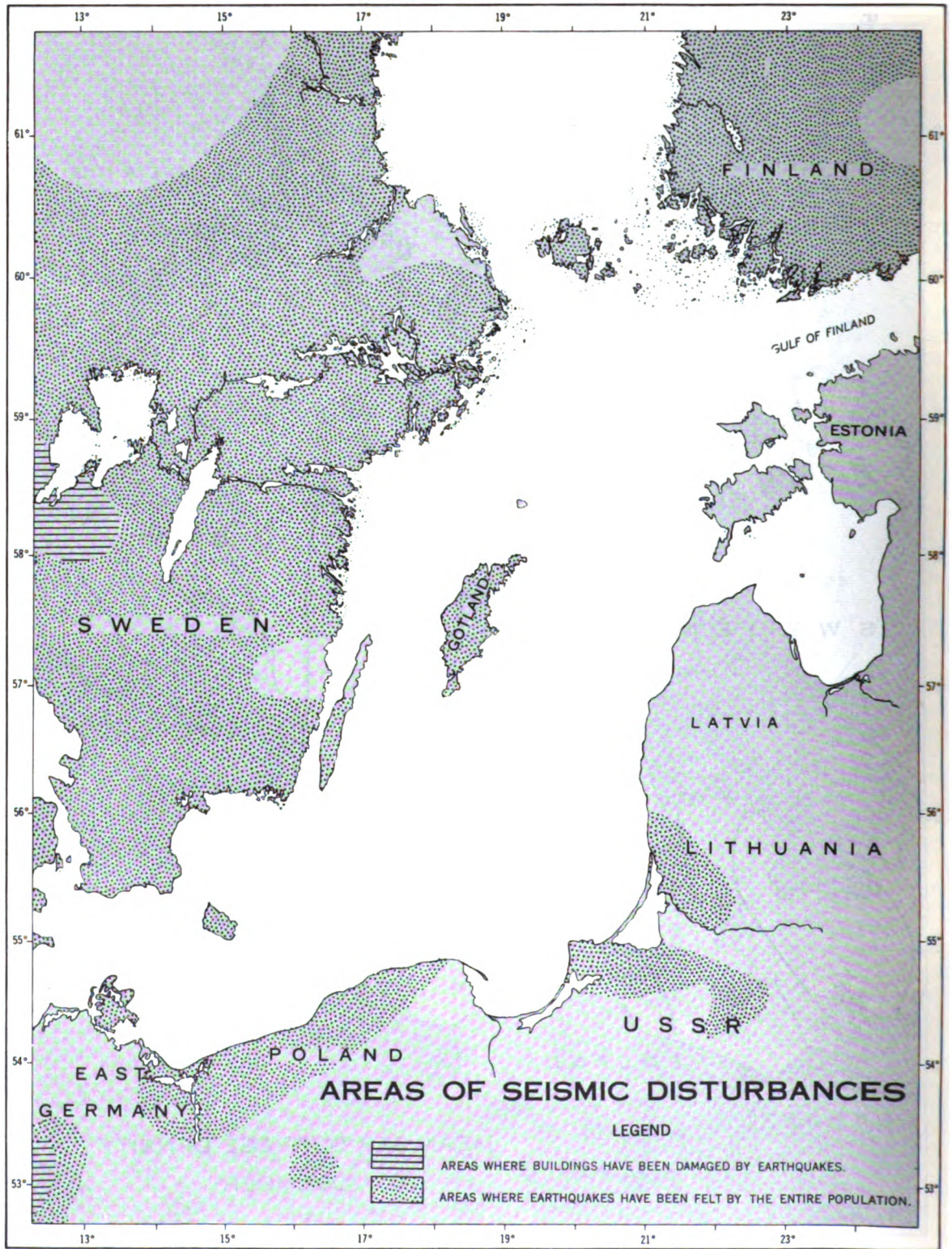


Figure 35

Figure 36

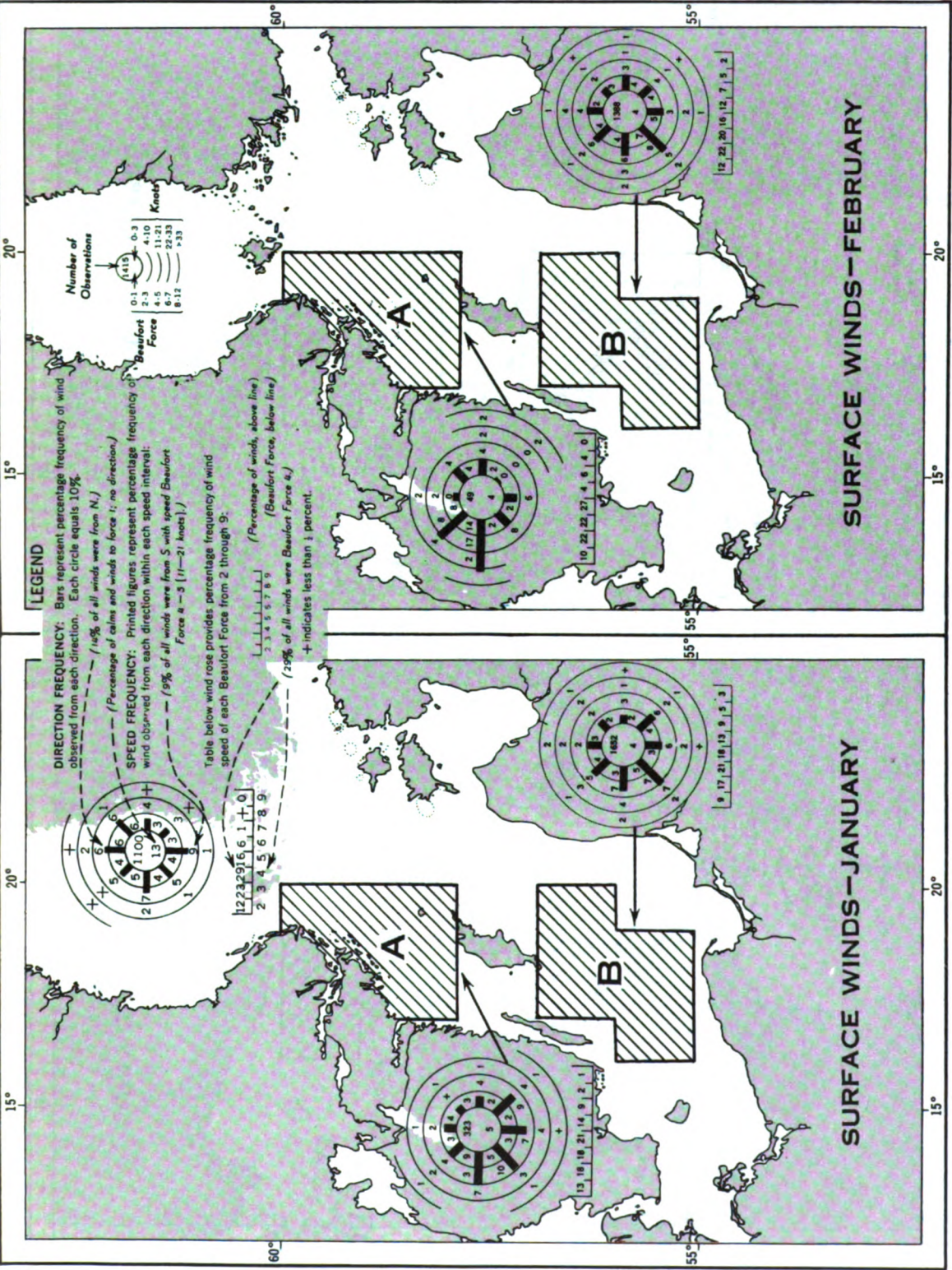
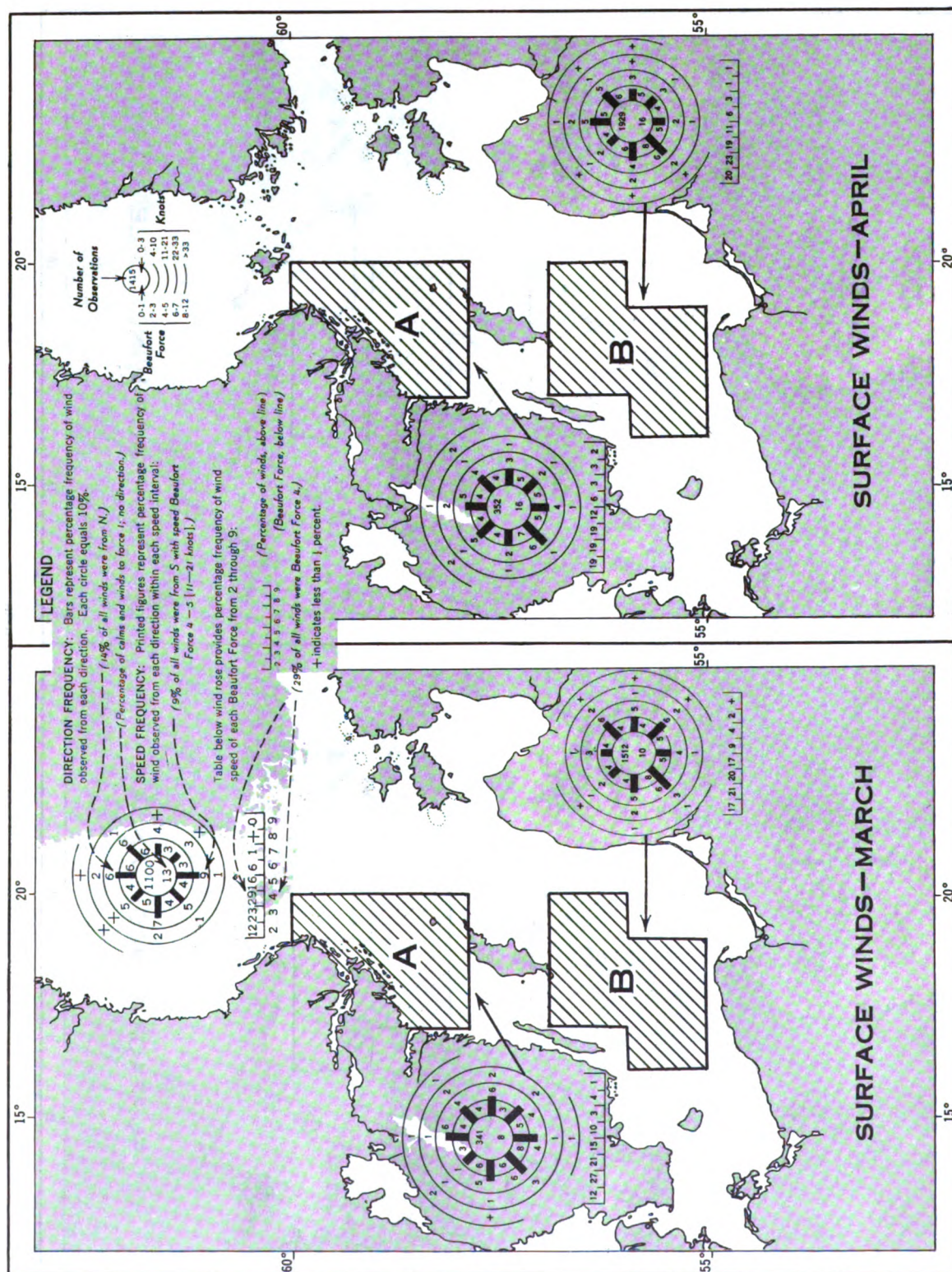
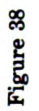


Figure 36





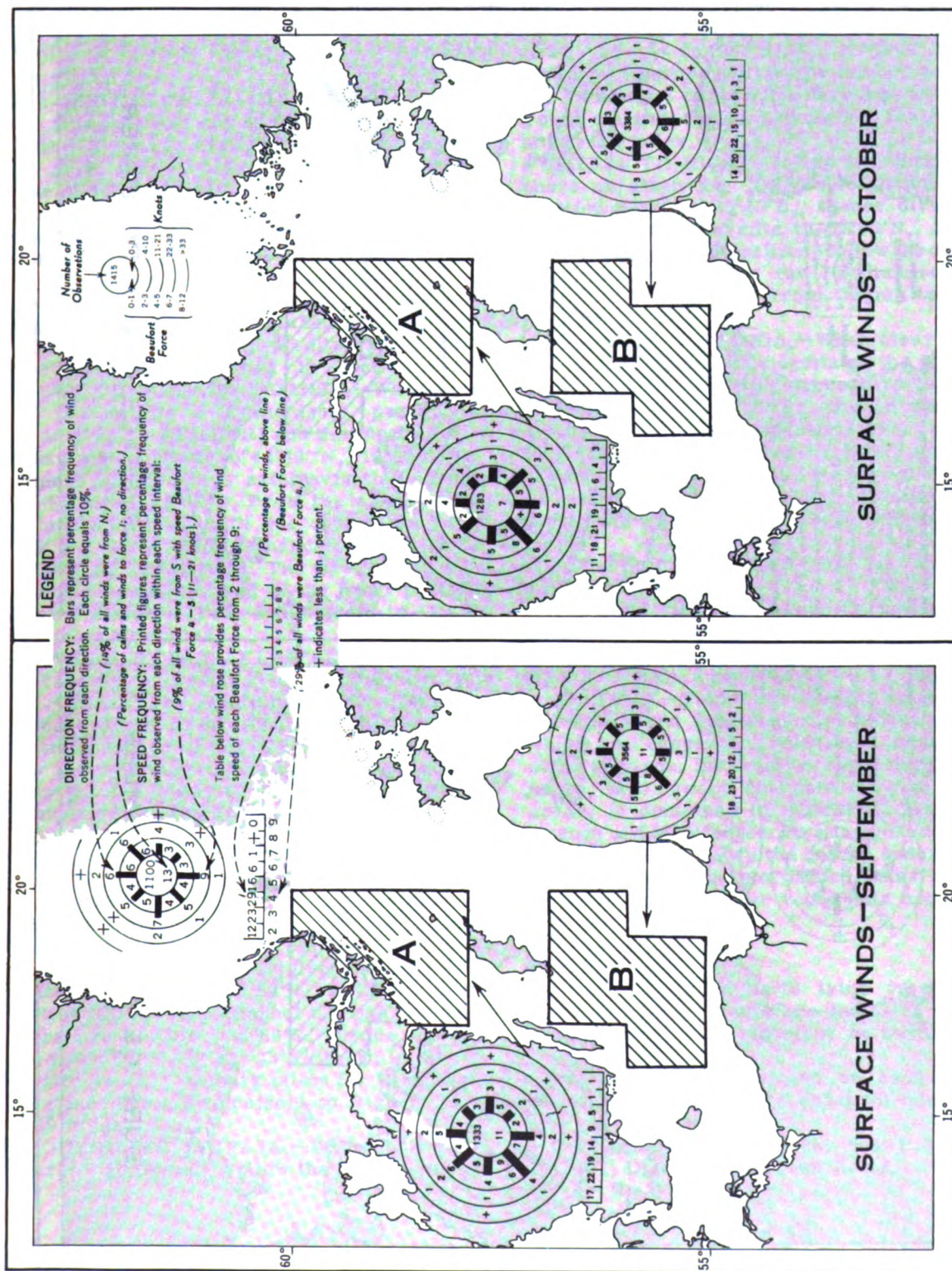


Figure 40

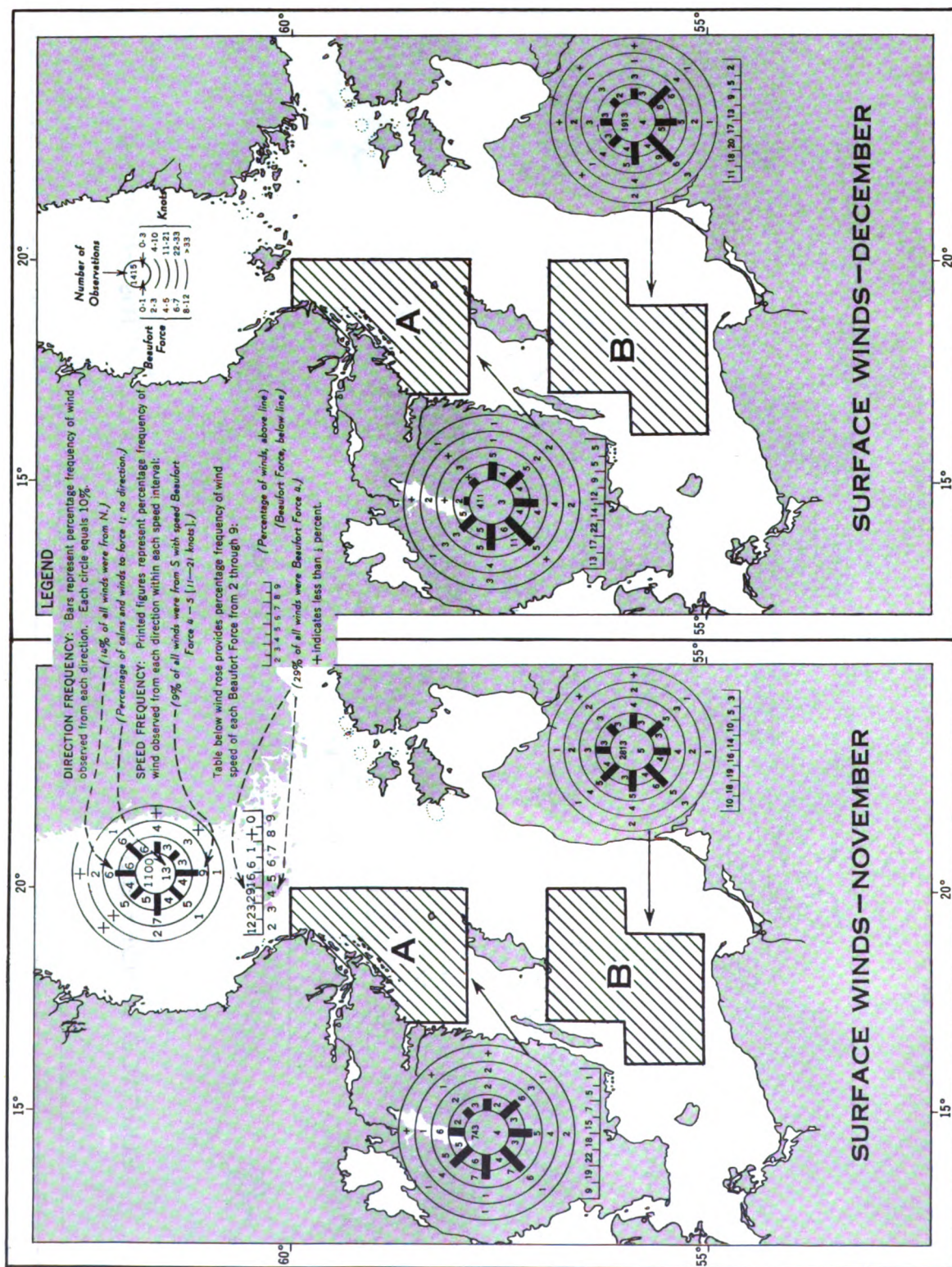


Figure 41

NAVIGATION

ROUTES LYING WITHIN THE LIMITS OF THIS VOLUME

1-139 GENERAL.—The routes described in this section are to selected ports lying within the area outlined in this publication. It must not be inferred that these routes have been adopted or established as sea lanes, nor do they necessarily represent the shortest distances between ports. Where the same route may be followed either way, the reverse route is not described.

NEMEDRI.—Before undertaking any voyage to and within the Baltic Sea, see NEMEDRI (Northern Europe and Mediterranean Routing Instructions) described in Section 1-118.

SWINOUJSCIE TO GDANSK.—When clear of the harbor at Swinoujscie, proceed as indicated by NEMEDRI and the most current charts to position 55°44'42"N., 16°00'00"E., thence as direct as safe navigation permits to 54°55'N., 18°20'E. From the latter position shape a course, with due caution, to 54°37'45"N., 18°55'45"E., thence to position 54°27'00"N., 18°40'42"E. The pilot is met about 1 mile southwestward of the latter position. Total distance from Swinoujscie to Gdansk is about 209 miles.

SWINOUJSCIE TO KLAIPEDA.—Follow the directions above as given for "Swinoujscie to Gdansk" to position 54°55'N., 18°20'E., thence direct to 55°44'N., 20°56'E. From the latter position, follow the detailed directions as given in this volume of Sailing Directions for about 6 miles to the harbor. Total distance from Swinoujscie to Klaipeda is about 268 miles.

SWINOUJSCIE TO RIGA.—When clear of the harbor at Swinoujscie, proceed as indicated by NEMEDRI and the most current charts to position 54°14'N., 15°00'E., thence to 54°54'N., 16°00'E. From the latter position, shape a course as direct as safe navigation permits to 57°52'N., 21°36'E., thence follow the buoyed channel through Irbenskiy Strait to 57°51'N., 22°39'E. Thence direct to position 57°06'30"N., 23°57'00"E; in this vicinity vessels embark pilots for Riga. Total distance from Swinoujscie to Riga is about 459 miles.

GDYNIA TO LIEPAJA.—When clear of the harbor at Gdynia, follow the buoyed channel

to 54°37'45"N., 18°55'45"E., thence as direct as safe navigation permits to 56°28'N., 20°40'E., thence to 56°31'N., 20°50'E. From the latter position, follow the lay of the channel for about 6 miles to the harbor at Liepaja. Total distance from Gdynia to Liepaja is about 153 miles.

GDYNIA TO RIGA.—Follow the directions above as given for "Gdynia to Liepaja" to position 56°28'N., 20°40'E., thence direct as safe navigation permits to 57°52'N., 21°36'E. From the latter position, follow the directions above as given for "Swinoujscie to Riga." Total distance from Gdynia to Riga is about 343 miles.

STOCKHOLM TO RIGA.—When clear of the harbor and having had negotiated the various channels of Stockholm, proceed to position 59°09'00"N., 19°08'30"E., thence shape a course as direct as safe navigation permits to 57°52'N., 21°36'E. From the latter position, follow the directions above as given for "Swinoujscie to Riga". Total distance from Stockholm to Riga is about 270 miles.

ROUTES OUTSIDE THE LIMITS OF THIS VOLUME

1-140 GENERAL.—Oceanic routing and passages through the North Sea and to the Baltic Sea are described in H.O. Publication Nos. 40 and 41, respectively.

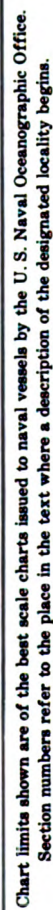
NEMEDRI.—There are several areas in the North Sea and approaches to the Baltic Sea which are dangerous because of mines and other hazards. Information concerning these areas, and swept channels through these areas, is contained in NEMEDRI (Northern Europe and Mediterranean Routing Instructions) which must be consulted before undertaking any voyage. Such information takes precedence over any other route data and must be strictly adhered to.

ROUTE CHART

1-141 Routes to ports lying outside the limits of this volume are indicated on the route chart in the envelope at the back of this publication.

The distances, indicated on each route, are shown on the route chart for comparative purposes only.

For additional distances, see H.O. Pub. No. 151, Distances Between Ports.



CHAPTER 2—GRAPHIC INDEX

CHAPTER 2

FALSTERBOUDDE TO TORHAMNSUDDE, INCLUDING BORNHOLM AND CHRISTIANO

- PART A. Falsterboudde to Sandhammaren.
- PART B. Sandhammaren to Torhamnsudde.
- PART C. Bornholm and Christianso.

Plan.—This chapter describes the southern coast of Sweden between Falsterboudde and Torhamnsudde, including the off-lying islands of Bornholm and Christianso. The sequence of description is from west to east.

GENERAL REMARKS

2-1 The coast between Falsterboudde and Sandhammaren, about 49 miles eastward, is generally low and sandy backed by flat to gently rolling plains. The bare Kasehuvud Headlands, and the Romeleas, a ridge appearing as two high hillocks, are natural landmarks. From Sandhammaren the coast turns north-northeastward, the terrain becoming higher with forested hills appearing in many places. At Listershuvud, a prominent point about 45 miles north-northeastward of Sandhammaren, the coast continues eastward to Torhamnsudde. This low and partly wooded coast is heavily indented and fronted by numerous islands and islets lying as far as 3 miles offshore.

With few exceptions, the 20-fathom curve contains all dangers lying up to 10 miles offshore. Many shoals and rocky patches lie along the coast inside the 10-fathom curve. Numerous wrecks lie off this coast. These can best be seen on the chart.

Principal ports include Trelleborg, Ystad, Åhus, Sölvesborg and Karlskrona. Karlshamn, Simrishamn, and Ronneby are also important. There are numerous fishing harbors of local interest.

Bornholm and Christianso are Danish possessions lying, respectively, about 20 and 34 miles southeastward and eastward of Sandhammaren. Ronne is the main port of Bornholm.

NAVIGATION

2-2 **APPROACH FROM THE SOUND.**—From a position about 3 miles eastward of Stevns Klint (55°17'N., 12°27' E.), a course of 104° for 8 miles leads to a position about 1 1/2 miles southward of Falsterborev Lightship. Thence a course of 090° for 49 miles leads to a position about 7 miles southward of Sandhammaren.

These tracks pass over a least depth of about 9 fathoms and have their closest coastal approach about 4 1/2 miles southward of Smygehuk.

APPROACH FROM THE BELTS.—From a position about 5 miles northeastward of Gedser Rev Lightship (54° 27'N., 12°11'E.), a course of 056° for 80 miles leads to a position about 7 miles southward of Sandhammaren. Thence a course of 059° for 73 miles leads to a position about 13 miles south-southeastward of Torhamnsudde.

These tracks pass over a least depth of about 8 1/2 fathoms and have their closest coastal approach in the vicinity of the lightship.

Detailed navigational information pertaining to port approaches is included in the principal description of the ports.

NEMEDRI, (sec. 1-118), supersedes any navigational directions for this chapter.

CAUTION.—Off Sandhammaren, stormy weather causes variable depths inside the 10-fathom curve along with a strong onshore current. Ships should remain at least 7 miles offshore.

WINDS—WEATHER

2-3 See section 1-133.

Westerly and southwesterly winds predominate throughout the year along the southern coast of Sweden, but not in the true meaning of a trade wind. In many areas the wind is variable as to direction and force. For example, a fresh breeze may blow on the western coast of Bornholm, while a calm prevails on the eastern side. Strong winds or gales are rare during the spring and summer months. Easterlies sometimes blow in late winter and spring. Land and sea breezes are felt along the coastal regions of Sweden during the summer months.

The weather in southern Sweden, under the influence of the Gulf Stream, is remarkably mild considering the latitude. Fog is encountered most frequently in the winter. Mild southwesterly winds entering the Baltic from the North Sea, following a period of cold, will cause dense fog. Sea smoke appears on coastal waters during periods of severe cold ashore.

Precipitation along the southern coast of Sweden is low. Snowfall is usually not heavy.

CURRENTS—WATER LEVEL

2-4 See sections 1-122, 1-121.

In general, there is a weak southwesterly and west-southwesterly current along the southern coast of Sweden. Surface currents are largely dependent on meteorological conditions over Scandinavia and the influx of fresh water flowing from rivers into the Baltic. The unsteadiness of drift and surface currents, which may not always set in the direction of the prevailing winds, is not apparent near the shore where gentle winds do not effect the currents.

WATER LEVEL.—The water level along the southern Swedish coast depends largely upon wind conditions. Consistent strong easterly winds in the Baltic create a higher water level. The opposite is true during periods of strong westerly winds. Chief deviation in water level occurs in the winter when the rise and fall could exceed 3 feet.

Coastal configurations cause much local deviation in the water level. Along the Falsterbo-Stenshuvud coast the water level changes about 2 feet between mean and low tides, with a 1 1/2-foot change as far as Torhamnsudde.

ICE

2-5 See section 126.

During normal winters the southern coast of Sweden is ice-free. In severe winters, starting in the latter part of January, ice forms in the South Baltic and is forced towards the southern coast of Sweden by northeasterly and easterly winds.

PART A. FALSTERBOUDDE TOSANDHAMMAREN

2A-1 FALSTERBOUDDE (55°23'N., 12°49'E.) is the low, southwestern extremity of

Sweden. It is recognized by a lighthouse, the town of Falsterbo, a prominent church, and a resort hotel with a tower on the side of the easternmost building. The church appears from the offing as an islet encircled by trees.

Falsterbo Light is shown near the extremity of Falsterboudde.

Falsterborev, a reef of sand and gravel with depths of less than 1 fathom, extends about 5 miles southward from Falsterboudde and is about 9 miles wide. Numerous unmarked wrecks, rocks, and shoal patches lie on this reef.

Maklappen, a low, sandy islet connected with drying shoals, lies on the inner part of Falsterborev. It is privately owned and designated a protected area. Landing is prohibited. A tripod beacon with radar reflector marks the islet.

Blenheim, a shoal with a least depth of 4 fathoms and marked by a buoy, lies about 6 1/2 miles south-southeastward of Falsterboudde. A light buoy with a radar reflector is moored close southward of Blenheim.

Falsterborev and Blenheim lie inside the 5-fathom curve.

Falsterborev Lightship (55°17' N., 12°47' E.), is moored about 5 1/2 miles south-southwestward of Falsterboudde, clear of intervening dangers. The red hull, with two masts and a radar reflector, has "Falsterborev" painted in white on each side. A fog signal is sounded and a radiobeacon transmits.

Pilots inbound from the North Sea for the Baltic via the Kattegat obtain pilots in Malmo Roads or from Malmo Redd Lightship (Pub. 41). Outbound from the Baltic, pilots are obtained in Trelleborg Roads (sec. 2A-12).

COAST—GENERAL

2A-2 Between Falsterboudde and Smygehuk, the southernmost point of Sweden, about 19 miles east-southeastward, the coast is indented by two small bights. The southeastern entrance of the Falsterbo Canal is located in the first bight and the port of Trelleborg in the second. Between Smygehuk and Sandhammaren, about 29 miles eastward, the coast recedes about 4 miles northward forming a large bight with the port of Ystad

at its head. The entire coast is low, partly bare, and fronted by sandy beaches.

Trelleborg and Ystad are the principal ports on this coast.

Anchorage can be taken, with offshore winds and local knowledge, off Trelleborg and Ostra Torp, a fishing village close westward of Smygehuk. There is ample anchorage available in the roads off Ystad.

CAUTIONS.—Extensive drift net fishing is conducted off the coast between Trelleborg and Sandhammaren. Caution should be exercised to prevent net damage.

Submarine cables are laid from the Swedish coast between Blenheim (sec. 2A-1) and Kullagrunden (sec. 2A-14) southward to the German coast. Anchorage should only be taken in emergencies.

DEPTHS—DANGERS

2A-3 The 10-fathom curve lies about 10 miles off the coast in the vicinity of Falsterboudde. Thence it follows the trend of the coast eastward to Sandhammaren at two to four miles offshore. Off Sandhammaren it extends about 7 miles offshore. The numerous wrecks close to the 10-fathom curve can be seen on the chart. The dangers contained within the 10-fathom curve are described with the principal descriptions of the feature off which they lie, or in the approaches to ports.

Kriegers Flak, a bank of sand and stones with a least depth of 7 fathoms, lies with its western edge about 22 miles southward of Falsterboudde. A dangerous wreck, with 5 1/2 fathoms over it, marked by a lighted buoy, lies sunk near the eastern edge of the bank.

NAVIGATION

2A-4 See section 2-2.

CURRENTS—WATER LEVEL

2A-5 See section 2-4. The water level along this coast is unusual in that it falls rapidly with an onshore wind and rises rapidly with an offshore wind.

WINDS—WEATHER

2A-6 See section 2-3. Off Sandhammaren, stormy weather, especially with a north-easterly wind blowing, causes changeable

depths within the 10-fathom curve. During a southwesterly storm a strong inshore current flows. Under these conditions, ships are advised to navigate at least 7 miles off this coast.

COASTAL FEATURES—LANDMARKS

2A-7 Between Falsterboudde and Smygehuk, about 19 miles east-southeastward, the coast is low and devoid of prominent features except the Romeleas. This ridge, with Romeleklint rising 610 feet at the eastern end, is located about 17 miles northeastward of Trelleborg. It is an excellent landmark approaching this coast.

KAMPINGEBUKTEN

2A-8 Kampingebukten, a bight with depths of 3 1/2 to 9 fathoms, lies between Falsterboudde and Stavstensudde, a point about 9 miles eastward. The coast between the points is fronted by foul ground. Submarine cables are laid southeastward from the head of the bay.

Klapperasen, a 19-foot patch, and a dangerous wreck lie about 4 miles and 2 1/2 miles, respectively, west-southwestward of Stavstensudde. A shoal patch of 4 fathoms and another of 4 1/2 fathoms, each marked close southeastward by a buoy, lie about 3 1/2 miles westward of Stavstensudde.

Maglarp Church Tower, about 1 mile northward of Stavstensudde, is a prominent landmark.

Skare (55°22' N., 13°03' E.) is a fishing harbor located about 1 mile northwestward of Stavstensudde. Vessels with a draft of 6 1/2 feet, with local knowledge, can enter the harbor enclosed by eastern and western moles. A light (occasional) is shown from the western molehead. There is about 1,100 feet of quayage with depths of 3 1/4 to 6 1/2 feet alongside.

FALSTERBOKANALEN (55°24' N., 12°57' E.)

2A-9 Falsterbokanalen has been cut through the peninsula between Hollviken (Pub. 41), and Kampingebukten. The canal is about 1 mile long, 82 feet wide, and 23 1/2 feet deep. Canal transit is limited to ships with a draft of 22 feet and a beam of 65 1/2 feet. There are no canal dues.

Two breakwaters at each end of the canal extend about one-third mile seaward. Lights are shown from the heads of all the breakwaters.

A lock, about one-half mile long, has been constructed in the canal. The lock maintains an equal water level whereby a ship can normally transit the canal at any time without interruption. There are dolphins for berthing at each side of the lock and also inside the breakwaters. Mooring rings are secured on the canal banks. Gages showing water levels in the canal are located on a breakwater head at each canal entrance. Lights are shown from the eastern and western sides of the canal at the southern lock gates.

Hollvik railroad and highway drawbridge crosses the canal near the northern entrance. Vertical clearance under the bridge is about 12 feet. Usually, rail traffic across the bridge has priority over ship traffic through the canal.

CANAL APPROACH.—The southern canal entrance is located about 4 1/2 miles eastward of Falsterboudde. The northern approach to the canal is described in Pub. 41. Lights in range, 330°, lead through the approach and the 23-foot entrance channel to the southern breakwaters. The 330° range line passes close eastward of shoal patches marked by buoys.

The canal approach is marked by Kampingebukten lighted whistle buoy, with a radar reflector, moored 3 miles 330° from the breakwater entrance. The white sector of the light on the eastern breakwater head covers the fairway of the approach. A buoy moored about 1 mile seaward of the breakwater, marks the western side of the entrance channel.

REGULATIONS AND SIGNALS.—When traffic through the canal is prohibited for any reason, a flashing red light is shown from the head of the eastern breakwater. If unable to turn, mooring is available alongside the dolphins inside the breakwaters.

When traffic is temporarily suspended for any reason, a fixed red light is shown from the head of the eastern breakwater. Ships approaching the canal should then stop outside the heads of the breakwaters, and should not enter until the light is extinguished.

Before entering the canal, the sides of the ship must be clear of obstructions, with all lifeboats, davits, and ladders rigged in-board.

The speed of ships must not exceed 5 knots within the breakwaters and in the canal. A tug must be employed, if considered necessary by the pilot.

Other regulations and controls of traffic in the canal, and the approaches thereto, are in force. Pilots should be consulted in this respect.

Pilotage is optional with certain exceptions. Ships are boarded at Trelleborg Roads (sec. 2A-12), or at Malmo Roadstead. To avoid delay, prior notice of E.T.A. should be made by radio to the pilot center (station) at Trelleborg or Malmo.

COASTAL FEATURES—LANDMARKS (Continued)

2A-10 The coast between Stavstensudde and Smygehuk, about 10 miles east-southeastward, is fronted by a shoal, with off-lying patches lying up to 2 miles offshore closely contained by the 10-fathom curve. Foul ground, with a least depth of 1 fathom and marked close seaward by two buoys, extends about 1 1/2 miles south-southeastward from Stavstensudde. This danger is covered by the red sector of Trelleborg Light (sec. 2A-12).

The prominent Romeleas hills (sec. 2A-7), appear to have a bluish tint on approaching the coast. This low point features the monument on Stavstensudde.

TRELLEBORG HARBOR (55°22'N., 13°09'E.)

2A-11 Trelleborg Harbor is located about 2 1/2 miles eastward of Stavstensudde. Because of its favorable position, the harbor is of considerable importance. Inclement weather or ice seldom hinders navigation in the port.

NAVIGATION—FROM WESTWARD.—From a position on the coastal track (sec. 2-2), about 7 1/2 miles south-southeastward of Falsterboudde, a course of 062° for about 9 miles leads to the Approach Buoy and harbor entrance range. This track leads over a least depth of 9 1/4 fathoms.

FROM EASTWARD.—From a position on the coastal track about 4 1/2 miles southward

of Smygehuk, a course of 300° for about 8 1/2 miles leads to the Approach Buoy and harbor entrance range. This track leads over a least depth of 8 3/4 fathoms.

WINDS-WEATHER.—Although the harbor is unprotected from southerly and southwesterly winds, there is no sea or suction felt because of the shallow water in the approaches. A comparatively smooth sea prevails during onshore winds. Northwesterly and southwesterly gales cause an extensive lowering of the water level.

DEPTHS-DANGERS.—The approach channel has a least depth of 28 feet, and the channel between the breakwaters has a depth of 26 1/4 feet. There are depths of about 16 1/2 to 26 1/4 feet in the harbor. Ships with a draft of 25 1/4 feet can enter the harbor and berth alongside.

An obstruction, with a depth of 5 1/4 fathoms over it, lies about one-fourth mile eastward of the channel and 1 3/4 miles southward of the breakwaters.

LANDMARKS.—Closing the coast a gabled church, a silo and group of tanks are seen westward of the entrance. Visible eastward is a group of chimneys, one of which is about 213 feet high. At night, a water tower surmounted by a revolving, blue neon signboard is conspicuous.

HARBOR.—The harbor is formed by two breakwaters which extend from the eastern and western shores. The entrance between the breakwater heads is about 275 feet wide, but the dredged channel here is only 230 feet wide.

Inside the breakwaters, the harbor is divided into port areas known as Gamla Hamnen and Nyhamnen. Gamla Hamnen is divided by a stone pier, forming an eastern and western basin. A large dolphin stands close southward of the pierhead. The east basin has berthage along the northern and eastern sides with a depth alongside of 21 feet. The stone pier has 26 1/4 feet along both sides and 23 feet at its head. The west basin has berthage along its northern and western sides alongside which there is a depth of 23 feet.

Nyhamnen is a basin opening from the western side of the harbor. It is quayed on all sides except the northwestern, with the

eastern side having a depth of 26 1/4 feet. The southern side contains an oil quay along its greater part, alongside which there is a depth of 26 1/4 feet. The remainder has about 16 1/2 feet alongside. Ferry slips are located on the eastern side of the harbor.

2A-12 AIDS TO NAVIGATION.—Trelleborg Light, with a radar reflector, is shown from a tower located about two-thirds mile southward of the breakwater heads. A fog signal sounds at the tower. A submarine cable is laid from the tower to the shore, eastward of the eastern breakwater. The cable landing is marked by red and white beacons.

Lights in range, 014°, mark the eastern and western sides of the channel. The front range lights for each side are shown from the breakwater heads, which are illuminated at night by floodlight. The rear range lights are shown from the northern shore of Gamla Hamnen.

Obstruction lights, vertical, are shown atop a 426-foot radio mast located about 2 1/2 miles northeastward of Trelleborg Light.

The approach buoy, a lighted whistle buoy with a radar reflector, is moored close westward of the channel axis in a position about 2 miles off the breakwaters. The channel is buoyed in accordance with the Swedish system (sec. 1-25).

A radiobeacon transmits at the pilot station.

FERRIES-FERRY SIGNALS.—A regular train and passenger ferry service is maintained across the Baltic between Trelleborg and Sassnitz, (54°31' N., 13°39' E.) The following ferry signals are shown:

(a) On departing, a fixed red light is shown from the head of the eastern breakwater, and the same signal is shown under the main light at the channel entrance. These signals will be shown 30 minutes before departure and are extinguished when the ferry clears Trelleborg Light.

(b) On arriving during the day a black double cone is displayed on a mast at the head of the inner pier. At night, a green light visible only in the harbor, is shown from the same mast. These signals will be shown 30 minutes before the ferry is due to arrive, and until berthing is accomplished.

(c) When the ferry is leaving or entering, fixed green or orange range lights are shown from the northern or southern ferry berths, respectively. Fog signals are sounded.

PILOTS.—Trelleborg has a pilot station where pilots are requested for The Sound, Stora Bael, Kiel-Holtenau, and to harbors in the Baltic. Pilots board ships in the vicinity of the outer shoals. Pilots are available day and night. Requests for pilots are transmitted at least 5 hours prior to E.T.A. The pilot station is located at the southwestern end of Gamla Hamnen, near the northern entrance of Nyhamnen. For pilot signals and general pilotage information see section 1-111.

ANCHORAGE.—During northerly winds, ships can anchor between the two outer lighted buoys in 4 1/2 to 7 fathoms, clay mixed with sand and stones. This anchorage, westward of the range line, should not be attempted without local knowledge. Temporary anchorage is permissible in the harbor, clear of the channel.

DIRECTIONS.—Approaching Trelleborg, steer 016° for the water tower (sec. 2A-11), or keep the water tower in range about 020° with the tower on the head of the eastern breakwater. When abeam of the approach lighted whistle buoy, steer 014° between the two entrance ranges and enter the channel; thence be guided by the channel buoyage.

CAUTION.—NEMEDRI should be consulted for the approaches to Trelleborg. See section 1-118.

2A-13 TRELLEBORG, with about 21,000 inhabitants, is situated on the coast adjacent to the harbor. The surrounding countryside is generally flat and fertile.

Grain is exported in quantity, mostly to Swedish ports. Imports include German manufactured automobiles, fertilizers, and fuels. There is a Customs service in port.

BERTHS.—There is about 5,000 feet of quayside in the harbor basins with depths alongside of 21 to 26 1/4 feet. The quays have several cranes of 5- and 6- tons capacity. Most of the berths have railroad connections.

SUPPLIES.—Provisions and fuel oils are procurable. Water is piped to the quays. Tugs are available.

REPAIRS.—There is no drydock in port. Minor above-water hull repairs can be effected.

COMMUNICATIONS.—There is a public radio station at Trelleborg. Local rail connections are made with the Swedish railroad system. A ship service is maintained between Trelleborg, other Swedish ports, and the Continent. Combination train and car ferries ply between this port and East German ports.

DERATTING.—See section 1-4.

MEDICAL.—Hospital facilities are available.

2A-14 Gislov Harbor (55°21'N., 13°14'E.) situated on the coast about 2 1/2 miles from Trelleborg, is frequented by local fishermen. Two parallel breakwaters, converging at their outer ends, extend offshore forming the harbor. Vessels with a maximum draft of 7 feet can enter the harbor. There are depths of about 10 feet but the harbor and entrance is subject to silting.

A light is shown from the head of the eastern breakwater and a fog signal is sounded occasionally.

Pilots for Gislov Harbor can be obtained at Trelleborg.

OFF-LYING DANGERS.—Vetestenen, a patch with a depth of 4 feet, lies about one-fourth mile southward of the breakwaters. Kullagrunden, a group of small shoals, lies between 2 and 3 1/2 miles southeastward of Gislov. A least depth of 2 fathoms is found on the westernmost shoal which lies about 1 1/2 miles offshore. Buoys mark the eastern and southern limits of the shoal. Kullagrund lighted whistle buoy, with a radar reflector is moored about 2 1/2 miles offshore, three-fourths mile southward of Kullagrunden. A dangerous wreck lies sunk close eastward of the buoy. The green sector on Trelleborg Light covers the wreck and Kullagrunden.

SMYGEHUK, the low southernmost extremity of Sweden, is situated about 7 miles east-southeastward of Trelleborg. It is recognized by all warehouses near the shore and churches at Ostra Torp and Ostra Klagstorp, the latter about 3 miles northward. A light is

shown near the extremity and a fog signal is sounded.

A wreck, with 7 fathoms over it, lies about 5 miles east-southeastward of Smygehuk and close southward of the 10-fathom curve.

2A-15 Between Smygehuk (55°20'N., 13°21'E.) and Sandhammaren, a blunt point about 30 miles eastward, the coast is indented forming a broad, open bay with the harbor of Ystad near its head. The regular coastline is low and sandy except in the vicinity of Ystad where there are steep bluffs. The high, bare, flat-topped Kasehuvud Headland (Kaseberg Head), sloping steeply seaward, dominates the landscape about 5 miles westward of Sandhammaren.

Depths increase gradually offshore to the 10-fathom curve which lies 1 1/2 to 2 miles off this coast. There are depths of 13 to 15 fathoms in the bay, sand and stones.

Ostra Torp, a fishing harbor, is situated close eastward of Smygehuk. Several church steeples in the vicinity are prominent. The harbor consists of two basins, the outer formed by two breakwaters. There is a depth of about 10 feet throughout the basins and alongside the quays. Vessels with a draft of 7 feet can enter the harbor.

Range lights lead through the entrance fairway to the inner harbor.

CAUTION.—Concrete blocks, close to the sides of the fairway, require vessels keep to the center of the channel.

Pilots can be obtained at Trelleborg.

Anchorage can be taken, with offshore winds, about one-half mile outside the harbor in 3 to 4 fathoms, sand and stone.

Provisions and water are available. There is a small marine railway in the inner basin.

Abbekas, a fishing harbor, is situated on the coast near Abbekasudde, a low point about 8 1/2 miles east-northeastward of Smygehuk. The harbor is formed by two breakwaters. Vessels with a draft of 7 feet can enter the harbor and berth alongside the pier. The entrance fairway is subject to silting.

A light is shown from the head of the eastern breakwater.

Pilots can be obtained at Ystad on request. Local knowledge is necessary.

Provisions and water are available in limited quantities.

YSTAD HARBOR (55°26'N., 13°50'E.)

2A-16 Ystad Harbor, situated about 8 miles east-northeastward of Abbekas, is a major port on the southern coast of Sweden. Two moles, enclosing a harbor area of nearly 20 acres, afford shelter.

NAVIGATION—FROM WESTWARD.—From a position on the coastal track (sec. 2-2) about 4 1/2 miles southward of Smygehuk, a course of 064° for about 16 miles leads to the Approach Buoy.

FROM EASTWARD.—From a position on the coastal track about 7 miles southward of Sandhammaren, a course of 296° for about 16 miles leads to the Approach Buoy. Both these tracks lead over a least depth of 9 3/4 fathoms in the vicinity of the Approach Buoy.

WINDS—WATER LEVEL.—Although the harbor is well sheltered, southerly and southwesterly gales raise a heavy sea outside the entrance. The greatest difference between the mean and low water level is 3 feet, with the normal level varying about 2 feet. There is a depth gage in the harbor.

ICE.—During a normal winter, ice offers no impediment to navigation in the harbor. If necessary, an icebreaker will render assistance.

DEPTHS—DANGERS.—There are two approach channels to Ystad. The eastern channel is available to ships with a draft of 20 feet; the western, to ships with a draft of 22 feet. There is a depth of 23 1/2 feet in the entrance channel and throughout most of the harbor. Ships with a draft of 22 feet can berth alongside many of the quays.

About 1 mile westward of Ystad, a reef with depths less than 3 fathoms extends about 1 mile offshore. Buoys mark the eastern and southern extremities of the reef.

Several 2 1/2- and 3-fathom patches lie between one fourth mile and three-fourths mile south-southwestward and southwestward of the western molehead. Snubblan, the innermost of the patches, lies close westward of the fairway. A 5 1/2-fathom shoal lies about 2 3/4 miles southwestward of the molehead.

Revnabben, the eastern point of Ystad, is surrounded by reefs and shoals with a least depth of 1 1/4 fathoms. This foul ground extends southeastward for about 1 1/2 miles and is marked on the southwestern edge by a buoy with a radar reflector.

Klostergrund, a 3 1/4-fathom rocky patch marked by a buoy with a radar reflector, lies about 1 1/2 miles southward of Revnabben.

A permanent minefield is laid in the harbor approach (sec. 1-109).

LANDMARKS.—Landmarks in the approach to the harbor consist of Kasehuvud (sec. 2A-15), the town church, a water tower and several silos, the most prominent of which is located close northward of the pilot station. The tall chimney of a sugar mill stands about 4 1/2 miles east-northeastward of Ystad.

HARBOR.—The harbor is formed by two converging moles with an entrance width of about 200 feet. There is over 4,000 feet of quayage in the harbor, the greater part having 23 1/2 feet alongside. Fronting the northern side are quays and a pier with 19 1/2 to 21 feet alongside. A shoal area with depths of 3 to 19 feet lies off the northwestern side of the harbor. Finger piers extend southwestward about 650 feet through the area. Extensions of the moles eastward and northward form the southern sides of the two principal quays, alongside which there is 23 1/2 feet. The heads of these quays have shoaled to the moleheads.

2A-17 AIDS TO NAVIGATION.—Lights in range, 019°, shown from the head of the western mole (55°25'N., 13°49'E.) and at the head of the harbor, lead through the fairway of the eastern approach channel to the harbor entrance. A fog signal is sounded at the front range light. A radiobeacon transmits from the pilot station, close to the root of the western mole.

A light is shown from the head of the eastern mole. A triangular beacon stands on a quay about one-fourth mile northeastward of the light. The light and beacon in range, 036°, leads through the fairway of the western approach channel to the harbor entrance.

Buoys marking channels, and shoal patches close to either fairway, conform to the Swedish system.

An approach lighted whistle buoy is moored on the 019° range alignment, about 2 1/2 miles off the western molehead.

PILOTS.—The pilot station is located on the quay near the root of the western mole.

Pilots are on duty between 0500- and 1900-hours Monday through Friday, otherwise on request. They board incoming ships in the roads southward of the shoals. Local knowledge is necessary. See section 1-111 for pilotage information in Swedish waters.

ANCHORAGE.—Anchorage in 8 to 9 fathoms can be taken in Spanska Redden, an area with good holding ground of sand and clay lying about 1 1/2 miles south-southwestward of the harbor entrance. Ships anchor with Ystad Church (55°26'N., 13°50'E.) and Kasehuvud (sec. 2A-15), bearing 025° and 098°, respectively.

The Outer Road, about 1 mile southwestward of the harbor entrance, affords good holding ground in 4 to 6 fathoms, sand and clay, with the rear range light well open of the front range light.

Both roads are open and unprotected against southerly gales, which raise a rather rough sea.

DIRECTIONS—EASTERN CHANNEL.—When about 3 miles from the harbor, bring the range lights in line 019°, thence steer on this range past the lighted whistle buoy until about three-fourths mile from the breakwaters. Thence change course slightly to the eastward, bringing the rear range light structure open its width eastward of the front light structure. Steer on this new bearing, skirting the eastern edge of Snubblan, thence between the channel buoys moored about one-third mile off the entrance.

WESTERN CHANNEL.—When about 3 miles off the harbor entrance and one-half mile westward of the lighted whistle buoy, steer 036° with the light on the eastern molehead in line with the beacon on the quay in the harbor. This course leads between channel buoys to within 250 yards of the moleheads at the harbor entrance. The channel is used only during daylight.

2A-18 YSTAD, a coastal town, has a population of about 14,000. It is a compact, flourishing town containing several factories, mills and foundries. The harbor is the center of considerable shipping activity.

Exports include grain, timber, china clay, machinery and sugar. Imports consist of fuels, iron, salt, saltpetre, fertilizers, and

other commodities. There is a Customs service in port.

BERTHS.—The greater part of the quayage in the harbor has a depth of 23 1/2 feet alongside. Extensive rail connections serve most of the berths. Numerous cranes of 2 to 9 tons capacity are available. There are grain elevators with silos on some quays.

SUPPLIES.—Potable water is piped onto the quays. Fuel oil can be obtained by tank truck. Provisions are procurable. There are tugs of 660 h.p. available. Swedish charts can be bought.

REPAIRS.—Minor repairs to hull and machinery can be made. There is a marine railway capable of taking vessels of about 500 tons.

COMMUNICATIONS.—The town is connected with the general railroad system. Regular cargo and passenger shipping services are maintained with Swedish ports, Hamburg, and Bornholm. Ystad is the terminus of a ferry service to Swinoujscie, Poland, Travemunde, Germany, and Rønne, Bornholm.

DERATTING.—See section 1-4.

COASTAL FEATURES—LANDMARKS (Continued)

2A-19 The coast between Ystad and Sandhammaren, about 13 1/2 miles southeastward, is unindented, with a sandy foreshore, except in the vicinity of the Kasehuvud Headland (sec. 2A-15). The few shoal patches along this coast lie within 1 mile offshore. The 10-fathom curve extends about 2 1/2 miles eastward of Sandhammaren and southwestward of Kasehuvud. Shoal patches of 4 3/4, 3 3/4, and 5-fathoms lie about 5 and 7 miles south-southeastward and 5 miles west-southwestward respectively, of Sandhammaren and close to the 10-fathom curve. Svartgrund, a small 7 1/2 fathom bank lies about 9 miles southward of Sandhammaren.

A submarine cable, its landing place marked by two beacons, is laid from about 1 mile northeastward of Revnabben (sec. 2A-16), southeastward to Bornholm.

Ryssgrundet, a 2 3/4-fathom shoal, lies on the 5-fathom curve about 2 miles eastward of Revnabben.

Kaseberga, (55°23'N., 14°04'E.) a coastal fishing harbor located close eastward of the

prominent Kasehuvud Headland, is formed by two breakwaters. There is a depth of about 10 feet in the harbor. A fairway leading to the harbor can accommodate vessels with a draft of about 6 1/2 feet. Silting occurs in the harbor and entrance. Strong easterly and southeasterly winds may lower the entrance depth to about 6 feet.

A light shown from the head of the northern breakwater, bearing 348°, leads through the fairway between patches of 3 and 3 1/2 fathoms to the entrance. A fog signal is sounded at the light.

Anchorage can be taken about 1-mile off Kasehuvud in 5 to 9 fathoms, good holding ground of sand and clay. The headland and adjoining hills protect the anchorage from northeasterly winds.

Pilots can be obtained at Ystad between 0500-1900 hours, and on request. Local knowledge is necessary.

Provisions and fuel oils are available in limited quantities.

SANDHAMMAREN (55°23'N., 14°12'E.), the low, sandy southeasternmost point of Sweden, is located about 5 miles eastward of Kasehuvud.

A light is shown and a fog signal is sounded from Sandhammaren. A radiobeacon transmits at the light. Sandhammaren light structure is reported to be a good radar target.

DEPTHS—DANGERS.—A sandy bank with depths of 5 to 10 fathoms, and closely encompassed by the 10-fathom curve, extends about 6 1/2 miles southward from Sandhammaren. Wrecks, best seen on the chart, lie within and close southeastward of the curve. A 4 3/4-fathom patch lies about 5 miles south-southeastward of the point. Osaknallen, a 1 3/4-fathom rocky patch marked by a buoy, lies about 2 1/2 miles west-southwestward of Sandhammaren.

CAUTION.—See section 2A-6.

PART B. SANDHAMMAREN TO TORHAMN-SUDDE

2B-1 SANDHAMMAREN is described in section 2A-19.

COAST—GENERAL

2B-2 At Sandhammaren the coast turns abruptly north-northeastward to Simrishamn,

thence north-northwestward to Stenshuvud, a conspicuous promontory about 19 miles from Sandhammaren. Between Stenshuvud and Listershuvud, a salient point about 28 miles northeastward of Stenshuvud, the coast recedes forming Hanobukten, a bay containing the ports of Ahus and Solvesborg. This entire coast shows many wooded hills. At Listershuvud the coast turns north-northwestward for about 8 1/2 miles, thence eastward for about 40 miles to Torhamnsudde. The coastline is much indented by numerous bights between rocky peninsulas fronted by islands and islets lying up to 3 miles offshore.

Ahus, Solvesborg, and Karlskrona are principal ports on this coast.

Anchorage can be taken, with offshore winds and local knowledge, close seaward of ports and the many fishing harbors. The principal anchorage is off Karlskrona, north-eastward of Aspo Island.

DEPTHS-DANGERS

2B-3 The 10-fathom curve follows the coast from 2 1/2 miles eastward of Sandhammaren to one-half mile offshore at Simrishamn and Stenshuvud. Thence it turns northeastward and approaches the coast about 1 mile eastward of Listershuvud. The many shoals lying in Hanobukten are contained within the curve which closes the coast about 10 miles southeastward of Ahus. The islands, rocks, and shoals fronting the coast between Listershuvud and Torhamnsudde lie within the 10-fathom curve which follows the coast about 2 to 5 miles offshore. All dangers inside the curve are described with related features or in port approaches.

OFF-LYING ISLANDS AND DANGERS

2B-4 Langagrund, a 2 3/4-fathom patch, lies almost 5 miles east-southeastward of Simrishamn. A spar buoy and a lighted buoy with a radar reflector mark the patch. The red sectors of Simrishamn and Stenshuvud Lights cover Langagrund.

Hano (56°01'N., 14°50'E.) a barren island lying about 2 miles east-southeastward of Listershuvud, and separated from the coast by a navigable passage, lies within the 10-fathom curve. Malkvarn, isolated rocks, lie about 1 mile northeastward of Hano. Lights are shown from the summit of Hano and on Bonsacken, the northwestern extremity. Fog

signals are sounded at Bonsacken and the southern extremity of Hano.

Hanobanken, an extensive bank lying between 2 and 6 miles southward of Hano and in the easterly approach to Ahus and Solvesborg, has numerous ridges with depths of 5 to 11 fathoms over sand and gravel.

Utklipporna, a group of rocks, lie about 8 1/2 miles southwestward of Torhamnsudde and 7 miles northwestward of the coastal track. The rocks and adjacent shoals are closely contained within the 10-fathom curve. The 20-fathom curve lies about 2 miles seaward of Utklipporna.

Utklippan Light (55°57'N., 15°42'E.) is shown from a fort standing on a rock at the southern end of the group. A fog signal sounds and a radiobeacon transmits at the light. Utklippan is a good radar target at about 12 miles.

Shoal patches with a least depth of 3 1/4 fathoms lie between Utklipporna and Utlangan (sec. 2B-33. Submarine cables are laid between these places.

Rosenklintsgrunden, a 2 1/2-fathom shoal, lies about 1 3/4 miles eastward of Utklippan. Holmebaden, a 1-fathom shoal, lies about 1 1/2 miles northeastward. Buoys mark the edges of the shoals.

Utklippan, a fishing harbor, is formed by two breakwaters. A basin in the harbor is 1 1/2 to 1 3/4 fathoms deep. A quay in the basin is about 165 feet long with 10 feet alongside. A light is shown from the head of each breakwater.

Dauids Banke, an isolated 6 1/2-fathom bank, lies about 16 1/2 miles eastward of Sandhammaren and 3 miles southeastward of the coastal track.

NAVIGATION

2B-5 See section 2-2.

WINDS-WEATHER

2B-6 See section 2-3. The coast between Sandhammaren and Listershuvud is open to easterly winds which can raise a considerable sea. Between Listershuvud and Torhamnsudde the water level may rise or fall about 3 feet above or below mean level. Winds between north and east raise the level; between northwest and south lower the level.

CURRENTS

2B-7 See section 2-4. Troublesome currents are caused by strong easterly winds along this coast. Currents of variable velocity and direction occur in the vicinity of Utklip-porna.

COASTAL FEATURES—LANDMARKS

2B-8 Between Sandhammaren and Stenshuvud, the land backing the coast increases in height and is more wooded than the southern coast. The sandy foreshore shelves seaward to the 20-fathom curve, about 2 to 4 miles offshore. Borrby Church, 4 1/2 miles northward of Sandhammaren, is prominent from the offing.

Ornhokaknosen, a 5 1/2-fathom patch on which the sea breaks in heavy weather, lies about 3 1/2 miles northeastward of Sandhammaren Light.

Skillinge (55°28'N., 14°17'E.), a fishing harbor with a prominent windmill and tower nearby, is located about 6 miles from Sandhammaren. Two moles form the harbor. An approach fairway, about 13 feet deep, leads between moleheads. Vessels with a draft of about 11 1/2 feet can enter the harbor where there is about 840 feet of quayage with 9 to 11 feet alongside.

Range lights, 290°, lead through the fairway to the harbor entrance. A fog signal is sounded near the front range light.

Anchorage can be taken about 1 mile off the harbor in 6 1/2 to 8 fathoms, good holding ground, sand and clay. During westerly gales vessels can anchor in 13 to 14 fathoms, about 2 miles offshore.

Pilots are obtained at Simrishamn (sec. 2B-10).

Provisions and water are available in limited quantities.

Brantevik, a fishing harbor located about 3 1/3 miles northeastward of Skillinge, is recognized by a windmill and Ostra Nobbelov Church, standing about 1 1/2 miles westward of Brantevik.

Currents setting parallel to the harbor entrance may attain a velocity of 2 or 3 knots.

The harbor is formed by two moles, with two outer breakwaters. An approach fairway, about 10 feet deep, leads into the harbor which is divided by a jetty into two basins, each about 10 feet deep. Vessels with a

draft of 9 feet can enter the harbor where there is about 300 feet of quayage with 9 to 10 feet alongside. The harbor entrance is difficult to make and not navigable in heavy weather.

Range lights lead through the fairway to the harbor entrance. A fog signal is sounded at the front light.

Pilots are obtained at Simrishamn (sec. 2B-10).

SIMRISHAMN (55°33'N., 14°22'E.)

2B-9 Simrishamn, situated about 2 1/2 miles northward of Brantevik, is a busy industrial and fishing port. The harbor is protected by two breakwaters and is usually free of ice.

NAVIGATION—FROM SOUTHWARD.—From a position on the coastal track (sec. 2-2) about 7 miles southward of Sandhammaren, a course of 021° for about 18 miles leads over a least depth of 7 fathoms to the entrance of the approach channel.

FROM EASTWARD.—From a position on the coastal track about 23 miles eastward of Simrishamn, a course of 270° leads over a least depth of 13 fathoms to the approach channel entrance. This track passes about 1 1/4 miles northward of Langagrund (sec. 2B-4).

WINDS—WATER LEVEL.—Simrishamn is exposed to easterly winds which cause a heavy swell to set into the outer harbor. During westerly gales the water level falls almost 3 1/4 feet below mean sea level.

ICE.—Severe winters may cause ice to form off the harbor in January and February. An icebreaker is available.

CURRENTS.—Winds of gale force cause the usually weak currents outside the harbor to attain a velocity up to 2 knots. Easterly and southeasterly gales cause the current to set into the harbor entrance.

DEPTHS—DANGERS.—An approach fairway, about 18 feet deep, leads to the entrance of the inner harbor. The outer harbor has depths of 16 1/2 to 18 feet; the inner harbor 16 to 16 1/2 feet. Vessels with a draft of 16 1/2 feet can enter the inner harbor.

Fringing shoals with a least depth of 1 1/4 fathoms and marked by buoys moored close seaward, extend offshore about 300 yards off the breakwaters.

Nedjan, a rocky 1 1/2-fathom shoal marked by a lighted buoy with a radar reflector, lies in a buoyed foul area about 1 1/2 miles northeastward of Simrishamn and about one-third mile northward of the approach fairway. It is covered by the green sector of Simrishamn Light. A dangerous wreck lies about two-thirds mile west-southwestward of Nedjan.

HARBOR.—The outer harbor is formed by two whitewashed breakwaters with the entrance about 165 feet wide. The inner harbor is formed by an eastern and western pier, with a 40-foot width between pierheads providing access from the outer harbor. Lock gates are closed across this entrance during heavy weather. Two cylinders are displayed by day and a violet light shown at night from the southern breakwater when the lock gates are closed. The inner harbor is quayed throughout. An entrance at the eastern side leads to a fishing harbor about 10 to 16 1/2 feet deep.

2B-10 AIDS TO NAVIGATION.—Lights in range, 250°, shown from the western pier and at the head of the harbor, lead through the approach fairway to the harbor.

A light is shown and a fog signal is sounded near the root of the southern breakwater.

PILOTS.—The pilot station is located near the root of the southern breakwater. Pilots attend at the harbor, boarding vessels seaward of the outer shoals. Pilots are available between 0600- and 1900-hours, Monday through Friday, and on request.

CAUTION.—It is dangerous for a vessel to attempt entry of the harbor when strong easterly winds prevail and the vessel is unable to obtain a pilot.

ANCHORAGE.—Anchorage in stormy westerly weather can be taken in 7 to 8 fathoms northward of the harbor entrance, good holding ground of sand and clay. Anchorage is also available in 14 fathoms southeastward of the harbor. Small vessels can anchor in the outer harbor during inclement weather.

DIRECTIONS.—When about 1 1/2 miles eastward of the harbor entrance, align a windmill in town between the breakwater heads, bearing 252°. Steer in on this bearing, passing southward of Nedjan. At night, steer

250° on the range light alignment to the harbor entrance. Pass between the breakwaters, altering course northward to clear the eastern pierhead of the inner harbor.

2B-11 SIMRISHAMN, with about 7,500 inhabitants, is the principal fishing harbor in the area. Brick, leather and other factories are located in town.

Exports include grain, cement and timber. Imports include fuels, fertilizers and sugar. There is a Customs service with bonded storage.

BERTHS.—There is about 360 feet of quayside in the outer harbor with 16 feet alongside. The inner harbor has at least 1,600 feet of quayside with about 15 3/4 feet alongside. The western pier, about 330 feet long, has railroad connections. Cranes are available on this pier and at some quayside berths. The fishing harbor has about 1,550 feet of wharfage with 10 to 16 1/2 feet alongside.

SUPPLIES.—Provisions are procurable. Water is piped to quays and piers; fuel oils can be obtained from tanks at some quays.

REPAIRS.—There is a boatyard and marine railway where minor repairs can be effected.

COMMUNICATIONS.—There are rail connections with the general railroad system. Shipping services are carried on with various Swedish ports, and with Bornholm during the summer.

DERATTING.—See section 1-4.

MEDICAL.—Hospital facilities are available.

COAST (Continued)

2B-12 Between Simrishamn and Stenshuvud about 7 miles distant, lies Rorumsklabb, a 4 3/4-fathom patch lying about 1/2 mile offshore in a position 5 1/4 miles north-northwestward of Simrishamn. A buoyed wreck lies close northeastward.

Baskemolla is a fishing harbor about 2 1/2 miles northwestward of Simrishamn. A fairway, with a depth of about 7 feet, leads between a mole and jetty at the harbor entrance. There are depths of 8 and 9 feet in the harbor, with 7 feet alongside the quay. The entrance and harbor are subject to silting. When strong easterly and northeasterly winds prevail, it is impossible to approach the harbor.

Range lights, occasional, lead through the fairway from northward to the harbor entrance.

Pilots are obtained from Simrishamn.

Vik, a fishing harbor about 1 1/2 miles from Baskemolla, has depths of 4 to 5 feet, subject to silting. Refuge is afforded, except in easterly gales.

2B-13 Between Stenshuvud and Listerhuvud, the coastal terrain increases in height and is partly wooded except in the vicinity of Ahus. There are several prominent hills. In this general area the bottom descends more steeply, with the 20-fathom curve lying about 2 miles seaward of the 10-fathom curve in many places.

STENSHUVUD (55°40'N., 14°17'E.), is a steep, wooded promontory, visible about 18 miles at sea. A light is shown close eastward. A white church with spire at Mallby, about 2 miles westward of Stenshuvud, is prominent.

Kivik is a fishing harbor about 2 1/2 miles northwestward of Stenshuvud. The harbor is formed by two moles. An approach fairway, in which vessels with a draft of 8 feet can enter the harbor, leads between moleheads. There is about 1,300 feet of harbor quayside with 5 to 10 feet alongside. The harbor and approach is subject to silting.

Range lights lead southward through the fairway into the harbor.

Anchorage can be taken with offshore winds in 7 1/2 to 10 fathoms, sand and clay, about 1 mile off the harbor. Small craft find protected anchorage inside the harbor.

Pilots are obtained from Simrishamn.

Fuel oils, water and provisions are available in limited quantities.

Vitemolla is a fishing harbor about 1 mile northwestward of Kivik. Two breakwaters form a harbor with depths of 7 to 8 feet, subject to silting.

Range lights, occasional, lead southwestward to the harbor entrance.

Rocky patches of 2 and 2 3/4 fathoms lie about one-half mile offshore and within 1 mile northward of Vitemolla.

Knaback (55°45'N., 14°12'E.), is the location of a gunfiring range (sec. 1-118). The semi-circular danger area extends about 10 miles seaward of Knaback.

Yngsjo is an inland fishing harbor reached by a river which empties into the sea about 6 1/2 miles northward of Knaback. A fairway leading to the harbor will accommodate vessels with a draft of 6 1/2 feet.

Range lights, occasional, lead through the approach fairway to the river entrance.

AHUS HARBOR (55°56'N., 14°19'E.)

2B-14 Ahus Harbor, at the entrance of the Helge River about 16 miles northward of Stenshuvud, is the port for Kristianstad, a city about 9 miles northwestward.

NAVIGATION—FROM SOUTHWARD.—From a position on the coastal track (sec. 2-2), about 6 1/2 miles south-southeastward of Sandhammaren, a course of 017° for 32 miles leads to a position about 11 miles southeastward of Ahus. Thence steer 348°, with Lagerholmen Light ahead, for about 8 miles to the pilot boat cruising grounds.

FROM EASTWARD.—From a position on the coastal track about 13 miles south-southeastward of Torhamnssudde, a course of 270° for 49 miles leads to a position about 8 miles east-southeastward of Ahus. Thence steer 315° for 4 miles to the pilot boat station.

All tracks lead over a least depth of 6 1/2 fathoms about 6 miles eastward of Ahus.

WINDS—WEATHER.—Ahus harbor is protected against winds from any quadrant. The low coastal area in the vicinity is open to southerly and easterly gales. Strong easterly winds raise the water level about 27 inches; westerly winds lower the water level about 20 inches below mean sea level.

ICE.—Ice is seldom a hindrance to shipping, and then only during prolonged easterly winds accompanied by a sharp frost, or following strong onshore winds.

CURRENTS.—Currents in the entrance fairways flow in a northerly and southerly direction at a velocity of 3 to 4 knots. Easterly and northeasterly winds cause a southerly current; westerly and southwesterly winds a northerly current. In the harbor, the currents flow seaward.

2B-15 DANGERS IN THE APPROACHES TO AHUS.—There are numerous shoals and rocky patches lying between 5 miles eastward and 9 miles south-southeastward of Ahus.

Only those dangers close to the approach fairways are described. Consult the chart for other hazards.

Pallagrund, a 2 1/4-fathom shoal marked by a buoy, lies about 5 miles eastward of Ahus. Taggen, a 3 3/4-fathom shoal marked by a lighted whistle buoy and spar buoys, lies about 4 1/2 miles east-southeastward of Pallagrund. The approach fairways converge between these dangers. Shoals of 2 1/4 to 4 1/4 fathoms extend about 8 1/2 miles southward from Pallagrund.

Kiviks Bredan, with several 2 1/4-fathom patches marked by buoys, lies across the southern inner approach fairway.

Botildos Breakers, a detached 4-fathom patch about 9 miles southeastward of Ahus, lies about 1 1/4 miles westward of the southern approach fairway.

DEPTHS—DANGERS.—An eastern approach channel, about 21 1/4 feet deep, leads to a position 1 1/4 miles eastward of the harbor entrance. Vessels with a draft of 19 1/2 feet are accommodated. Another approach channel, with a least depth of 29 feet, parallels the eastern channel close northward and leads to a common junction 1 1/4 miles off the entrance. An entrance channel, 27 3/4 feet deep and 230 feet wide, leads into the harbor.

Secondary channels, for vessels with local knowledge, lead from southward and north-eastward to the harbor over least depths of 23 and 19 1/2 feet, respectively.

The outer harbor has depths of 23 1/2 to 27 feet. Vessels with a draft of 26 feet can enter and berth alongside some quays. A channel leading to the inner harbor is 13 3/4 feet deep. There are depths of 12 to 13 3/4 feet in the inner harbor.

Numerous patches of 1 3/4 to 2 3/4 fathoms lie close to the approach channels. Many of these dangers, and all channels are marked by buoys in accordance with the Swedish system.

ASPECT—LANDMARK.—The terrain in the vicinity of Ahus is low and wooded. The coast southward of the harbor ends at Aspet (55° 55'N., 14°19'E.), a blunt cape. The Fjalkinge Hills are two, bare hills located about 7 1/2 miles northward of Ahus. Also prominent is Høklack, a round, high hill surmounted by trees, located about 6 miles northeast-

ward of the larger Fjalkinge hill. Extensive groves of fir trees stand on Vanneberga, about 2 1/2 miles northeastward of Ahus. A group of tall silos, churches without spires, and high chimneys are prominent.

HARBOR.—The harbor is formed by two moles extending eastward on each side of the river mouth. Between the whitewashed moleheads the entrance is so narrow that inbound and outbound vessels cannot pass each other. The harbor area extends 1 1/4 miles eastward of the entrance. The Outer Harbor consists of two turning basins on the southern side with depths of 23 1/2 to 27 feet and a bottom of clay, mud and sand. A channel 65 feet wide leads to the Inner Harbor and turning basins lying off a quay and pier.

AIDS TO NAVIGATION.—Lights in range, 289°, are shown about 1 mile northward and north-northeastward of the harbor entrance. About three-fourths mile southward and south-southeastward of the entrance are lights in range, 246°. Norra and Sodra range lights, 275°, are shown from the entrance of the harbor. Lagerholmen Light is shown about 5 1/2 miles northeastward of the entrance.

Mast beacons with white, triangular board topmarks, stand on Aspet and about 2 miles northward of Aspet. They serve as daymarks for the secondary channels.

PILOTS.—There is a pilot center (station) near the root of the northern mole. Ships are boarded 24-hours a day about 3 1/4 miles eastward of the moleheads. They should not proceed westward of the area covered by the red sector of Lagerholmen Light.

Pilots for vessels using the southern secondary channel are obtained about 8 miles southeastward of the moleheads.

2B-16 ANCHORAGE.—Anchorage can be taken in 5 1/2 to 7 3/4 fathoms, sand and clay, close northward of the entrance range and between 2 1/2 to 3 miles eastward of the moleheads. An inner anchorage, with depths of 4 1/4 to 5 1/2 fathoms, sand and clay, lies close southward of the entrance channel and about 1 1/2 miles eastward of the moleheads.

Anchorage can be taken in Spanska Redden, about 1 1/2 miles southward of the entrance, in 5 to 5 1/2 fathoms.

CAUTION.—These anchorages are open to southerly and easterly gales. Anchoring is not recommended at such times. It is prohibited to anchor in approach fairways.

DIRECTIONS.—Approaching from southward during the day, Høklack (sec. 2B-15) aligned 348° with Lagerholmen leads to the Bakoren Approach Range, bearing 289°. An alternate approach, with Fjalkinge Backe bearing 323°, leads from southeastward to the approach range. Steer a course of 289° until the Revhaken Range is aligned 246°. Steer on this bearing until the entrance range bears 275°. With this bearing as a course steer between moleheads into the harbor.

From about 4 miles eastward of the moleheads, steer 275° on the entrance range through the eastern approach channel and into the harbor.

2B-17 AHUS, a town with about 4,500 inhabitants, is situated along the northern sides of the Helge River about 1 1/2 miles within the entrance. There is a customs office and bonded storage.

Exports include grain, granite, paper, pit props, crude alcohol and timber. Imports include fuels, oil cake, linseed, cement and fertilizers.

BERTHS.—There is about 4,800 feet of quays, all served by the railroad, with depths of 23 1/2 to 27 feet alongside. The inner harbor quay and a pier have depths of 12 to 13 3/4 feet alongside. Several cranes with capacities up to 12 tons are on the quays. Grain elevators are available.

SUPPLIES.—Provisions, fuel oils, and water are available on the quays. Potable water is also supplied by water boat. Tugs are available.

REPAIRS.—Minor general repairs can be made.

COMMUNICATIONS.—Ahus has rail connections with the general railroad system. There are shipping services to Stockholm, Göteborg and intermediate ports.

DERATTING.—See section 1-4.

MEDICAL.—There is a general hospital at Kristianstad, about 9 miles distant.

COASTAL FEATURES—LANDMARKS (Continued)

2B-18 The coast between Ahus and Kraknabben (56°00'N., 14°43'E.), a point about

14 miles east-northeastward, is low and wooded in part and backed in areas by high hills. Numerous bights encumbered with rocky patches indent the coast which is fronted by islets and shoals for about 5 miles offshore.

There are fishing harbors at the head of several bights. Solvesborg, the only port of importance, is situated about 11 miles northeastward of Ahus.

Ryssberg, a ridge of high hills rising about 2 miles northward of Solvesborg, is an excellent landmark seen from the south-eastward and eastward. Closing the coast a grove of deciduous trees marks Lando, a peninsula about 4 miles northeastward of Ahus.

Lagerholmen, a rocky islet about 2 miles eastward of Lando, is a government preserve on which landing is prohibited. A light is shown from the islet.

SOLVESBORG HARBOR (56°03'N., 14°35'E.)

2B-19 Solvesborg Harbor is located on the northwestern side of Solvesborgsviken, a bight indenting the northern coast of Hanobukten (sec. 2B-2).

NAVIGATION —FROM SOUTHWARD.—See section 2B-14. From a position about 11 miles southeastward of Ahus steer 348° for 7 miles, keeping Lagerholmen Light aligned with the western side of Høklack (sec. 2B-15). When the Bakoren approach range to Ahus bears 289° change course to 019° and proceed for about 3 miles to the pilot cruising grounds. The tracks lead over a least depth of 5 fathoms about 2 1/2 miles southeastward of Lagerholmen.

FROM SOUTHEASTWARD.—From a position on the coastal track about 33 miles eastward of Stenshuvud (sec. 2B-13), a course of 313° for 33 miles leads to the pilot cruising grounds about 3 1/2 miles south-southward of Solvesborg. This track leads over a least depth of 6 fathoms.

WINDS—WEATHER.—Strong southwesterly winds raise a rough sea in the roadstead southward of Solvesborgsviken.

ICE.—Ice may impede shipping during prolonged cold weather in January and February.

DANGERS IN THE APPROACHES TO SOLVESBORG.—There are numerous shoals and rocky patches lying in the approaches to Solvesborg. Only those dangers lying close

to the fairways are described. Consult the chart for other hazards.

Kanningen, a 2 3/4-fathom shoal marked by a buoy, lies about 2 miles southeastward of Lagerholmen and close westward of the southern approach fairway. A 3 1/2-fathom patch lies in the fairway eastward of the buoy.

Kaglan, a 3 1/4-fathom patch marked by a buoy, lies about 2 miles east-southeastward of Lagerholmen.

Revbadorna, reefs with less than 2 fathoms marked by buoys, extends about 2 miles southward from Vastra Nasnabben, the eastern entrance point of Solvesborgsviken.

Bullerasen, a 2 3/4-fathom shoal marked by buoys, lies between Revbadorna and Skintosafloten, an extensive shoal lying northeastward of Kaglan. The fairway leads close westward of Bullerasen.

Spatgrund, a 3-fathom shoal marked by a buoy on the eastern edge, lies southeastward of Bullerasen.

DEPTHS—DANGERS.—The two approach fairways leading from southward and southeastward to the Outer Road will accommodate ships with a draft of about 27 feet. A channel, 245 feet wide and 27 feet deep, leads from the Outer Road to the Inner Road. From the latter, a channel 24 1/2 feet deep leads to the Inner Harbor, 21 1/4 to 24 1/2 feet deep. Ships with a draft of 23 feet are accommodated. The Outer Harbor is about 750 feet wide and 27 feet deep.

Numerous patches of 1 1/2 fathoms or less lie close to the entrance channel. The dangers and the channel are marked by buoys according to the Swedish system.

LANDMARKS.—The Hjarthalla and Stibybacke Hills, rising 220 and 121 feet, respectively, are prominent eastward of Solvesborg.

2B-20 HARBOR.—This sheltered harbor is comprised of Outer and Inner Harbors. The former, located on the northwestern side of the Inner Road, is fringed northward and southward by shoals which extend to the channel leading to the Inner Harbor. A timber quay, oil jetty, and pilot harbor are located in the Outer Harbor.

The Inner Harbor, with a bottom of clay and mud, is confined between the harbor quays and shoals lying about 525 feet east-

ward. Shoals front the shore and channel southward of the harbor. Spars and dolphins mark the edge of the shoals. The western side of the harbor is quayed.

AIDS TO NAVIGATION.—Beacons in range, 019°, on islets lying close southeastward of the Inner Harbor, lead through the fairway of the southern approach to the entrance channel. The white sector of Tunoren Light (56°00'N., 14°32'E.), leads through the southeastern approach fairway to the entrance channel. By day, the Tosteberga Pines standing about 3 miles west-northwestward of Tunoren, in range 294° with Fjalkinge Backe (sec. 2B-15), leads to the entrance channel over a least depth of 6 fathoms.

Lights in range, 026°, shown in the Inner Roads and from the shore north-northeastward, lead through the entrance channel to the inner roads.

Lights in range, 355°, shown close northward of the Outer Harbor and also in Solvesborg, lead through the channel to the Outer and Inner Harbors.

Lights in range, 012°, shown at the head of the inner harbor, lead to the quays.

PILOTS.—Solvesborg has a pilot station at the Outer Harbor. Pilots are obtained at the junction of the approach fairways, about 2 miles southwestward of Vastra Nasnabben. They are also obtained near the outer shoals of the southern approach fairway. Pilotage is performed between 0500- and 1900-hours, otherwise, on request.

ANCHORAGE.—Anchorage can be taken in the Outer Road, about two-thirds mile southwestward of Vastra Nasnabben (sec. 2B-19). There is good holding ground of sand and clay in 4 fathoms, but swinging room is limited and the anchorage is open to southwesterly gales.

The Inner Road, about 1 mile southward of Solvesborg, has anchorage depths of 3 1/2 and 4 fathoms, mud and clay.

DIRECTIONS.—From the junction of the southern and southeastern approach fairways steer 026° on the entrance range through the buoyed channel for about 2 miles to the Inner Roads. Thence steer on the 355° ranges, being guided by the channel buoyage and beacons, to the Inner Harbor.

2B-21 SOLVESBORG, with about 6,600 inhabitants, is situated adjacent to the Inner

Harbor and about 2 miles northward of the eastern entrance of Solvesborgsviken.

Exports include pit props, lumber, granite, wooden goods, and paper pulp. Imports include fuels, grain, cement, china clay, and sulphur. There is a customs office and bonded storage.

BERTHS.—There is about 2,200 feet of quayside in the Inner Harbor with depths of 21 1/4 to 24 1/2 feet alongside. The Outer Harbor has about 650 feet of quayside with a depth of 27 feet alongside. There is also an oil jetty about 80 feet long. All the quays in the harbors have railroad connections.

There is a shipyard, with a quay about 650 feet long and depths of 14 to 16 1/2 feet alongside, located between the harbors. There is a 50-ton crane at the shipyard. Several cranes with capacities of 5 to 18 tons are available on the harbor quays.

SUPPLIES.—Provisions can be obtained. Fuel oils and potable water are piped to the quays. Boiler feed water is requested through the Harbor Authority. A tug is available. Nautical charts are sold.

REPAIRS.—There is a boatyard and marine railway in the Inner Harbor. General repairs to hull and machinery are made in the shipyard. The drydock is 340 feet long overall, 51 feet wide, with a maximum depth of 12 1/2 feet over the sill. Vessels of 3,500 d.w.t. are admitted.

COMMUNICATIONS.—Solvesborg is connected with the Swedish railroad system. There are shipping services to Stockholm, Goteborg and intermediate ports.

DERATTING.—See section 1-4.

MEDICAL.—Medical services are available.

COASTAL FEATURES—LANDMARKS (Continued)

2B-22 The coast between Solvesborg and Kraknabben, about 6 miles southeastward, is irregular and wooded. Several bights fringed by reefs but open to navigation indent this coast. Prominent hills (sec. 2B-19) stand about 1 mile inland.

Sillnasudde (56°00'N., 14°37'E.), an islet, lies close southward of a point 1 1/2 miles southeastward of Vastra Nasnabben. A light is shown from the islet. Vastra and Ostra Torsoviken indent the coast between Sillnasudde and Bjorknabben, a point about 2 miles eastward.

Torso, a fishing harbor at the head of Ostra Torsoviken, is formed by three breakwaters. The harbor is 6 1/2 feet deep. Vessels with a draft of 5 feet can enter the harbor and berth alongside the quays.

Range lights lead through the approach fairway to the outer breakwater.

Pilots can be obtained at Solvesborg.

Provisions, water, and fuel oils are available in limited quantities.

Hallevik is a fishing harbor at the head of Halleviksviken, a bight between Bjorknabben and Kraksnabben. Krakrevet, a reef marked by buoys, extends about 1 1/2 miles south-southwestward from Kraknabben.

A gunfiring range, the eastern and western limits bounded by Hano Island (sec. 2B-4) and the western entrance point of Solvesborgsviken, extends about 7 miles southward from Hallevik.

Two moles and a detached breakwater form a harbor with depths of 7 1/4 to 10 feet. There are several finger piers, and a quay with 9 3/4 feet alongside, in the harbor. An approach fairway, in which vessels with a draft of 7 1/2 feet can enter the harbor and berth alongside the quay, leads to the southern molehead.

A light, the white sector covering the fairway, is shown from the southern molehead.

Pilots can be obtained at Solvesborg.

Anchorage can be taken, with offshore winds, in 4 to 7 fathoms, in the northeastern part of Halleviksviken. The preferred anchorage, in 3 fathoms, lies about 400 yards southeastward of the light.

Provisions, fuel oil, and water can be obtained.

2B-23 Between Kraknabben and Listershuvud, a prominent point about 3 1/4 miles northeastward, the coast is high and steep. The southern extremity of Hano (sec. 2B-4) lies about 4 miles eastward of Kraknabben.

Nogersund, a fishing harbor at the head of a bight about 1 mile from Kraknabben, is formed by two breakwaters. The harbor contains inner and outer basins with depths of 8 to 10 1/2 feet, respectively. Vessels with a draft of 10 feet can berth alongside outer basin quays. An approach fairway about 14 1/2 feet deep leads between breakwater heads to the harbor entrance.

Range lights lead through the fairway to the harbor. A fog signal is sounded from the front range light. A light is shown from the head of the eastern breakwater.

Pilots can be obtained at Solvesborg.

Provisions and fuel oils can be obtained. Water is piped to the quays.

Hano Harbor, on the western side of the island, (sec. 2B-4), is a fishing harbor formed by two breakwaters. An approach fairway accommodating vessels with a draft of 9 feet leads between breakwater heads into the harbor where there are depths of 7 1/4 to 13 feet. Vessels of 8 1/4-foot draft can berth alongside the quays.

Range lights lead through the fairway into the harbor.

Anchorage can be taken about one-fourth mile northward of the harbor in 3 to 5 fathoms, sand.

Pilots can be obtained at Solvesborg.

Hanosund, about 2 miles wide with depths of 7 to 16 fathoms, lies between the western side of Hano and the mainland. Submarine cables are laid across Hanosund. A power cable is laid between Listershuvud and Hano Harbor. Range lights mark the landings. Anchoring is prohibited in the vicinity of the cable.

The white sector of Tarno Island Light (56°07'N., 14°58'E.), leads in the preferred passage through Hanosund, clear of all dangers. Remaining in this sector avoids possible damage to fishing gear in the sound.

Several shoals and rocky patches lie in Hanosund. Fladingen, a 1 1/2-fathom rocky shoal marked by a buoy with a radar reflector close southward, lies about 1 1/4 miles eastward of Nogensund. Patches of 2 1/4 and 2 3/4 fathoms lie between 1 1/4 and 2 miles east-northeastward of Nogensund. The eastern edge of the patches is marked by a buoy.

Anchorage can be taken in 10 to 13 1/2 fathoms, sand and clay, southwestward and northeastward of Hano. Storms cause a heavy swell at both anchorages.

LISTERSHUVUD (56°02'N., 14°47'E.), at the northwestern side of Hanosund, is a prominent point about 275 feet high. A light is shown from the point.

2B-24 Between Listershuvud and Golandet (56°08'N., 15°18'E.), a peninsula about 19 miles east-northeastward, the coast is irregular, low and forested. It is fronted by reefs extending about 3 miles offshore in places and numerous islets and shoals lying within the 10-fathom curve.

Tarno Island, about 8 miles northeastward of Listershuvud, is prominent. Karlshamn and Ronneby are the main ports. Sheltered anchorage can be taken off these harbors.

Horvik, a fishing harbor about three-fourths mile northwestward of Listershuvud, is formed by two moles. An approach fairway accommodating vessels with a draft of 9 feet leads to the northern molehead. There are depths of 8 to 10 1/2 feet in the harbor and alongside the quays.

A light shown from the northern molehead, bearing 200°, leads through the fairway. A fog signal sounds at the light.

Anchorage can be taken, close northward of the harbor, in 3 to 5 fathoms, sand.

Pilots are obtained at Solvesborg or Karlshamn.

Provisions, fuel oils and water are available in limited quantities.

Krokas, a fishing harbor about one-half mile northwestward of Horvik, is protected from easterly weather by a breakwater. The harbor is 6 1/2 feet deep. An approach fairway, in which vessels with a draft of 6 feet can enter the harbor and berth alongside the quays, leads to the entrance.

Range lights lead through the fairway.

Anchorage can be taken in 2 fathoms, in the fairway, clear of the breakwater.

Pilots are obtained at Solvesborg or Karlshamn.

Laxgrund is a shoal partly awash lying about 1 mile eastward of Horvik. Buoys mark the northern and southeastern sides, the latter with a radar reflector. Reefs extend about one-half mile northeastward of Horvik.

Kasebaden are detached patches of 2 and 3 fathoms marked by a buoy, lying about 1 mile eastward of Krokas. Stormy weather rises heavy seas on Kasebaden.

Pukaviksbukten, a bay indenting the coast between Listershuvud and Starno, a blunt

peninsula about 6 1/2 miles north-northeastward, is encumbered by rocks, reefs and shoals. Fairways lead between the dangers to several fishing harbors on the shores of the bay. There are anchorages in the approaches. Local knowledge is required.

Djupekas is a village about 2 miles northwestward of Krokas. A fairway leading to the anchorage off the village will accommodate vessels with a draft of 11 1/2 feet.

Range lights lead through the fairway.

Anchorage can be taken in 2 to 4 1/2 fathoms, good holding ground.

Pilots can be obtained at Solvesborg or Karlshamn.

A light for local fishermen is shown about 2 miles northward of Djupekas.

Ornavik (56°08'N., 14°40'E.) is a fishing harbor near the head of Pukaviksbukten. Anchorage can be taken in the outer harbor in 1 1/2 to 3 fathoms, sand and gravel. Anchorage, sheltered from all winds, can be taken in 3 to 5 fathoms, sand, about 1 mile southeastward of Ornavik.

Pukavik, at the head of the bay about 8 1/2 miles north-northwestward of Listershuvud, has a sheltered harbor about 10 1/2 to 14 feet deep, sand and clay. An approach fairway in which vessels with a draft of 12 feet can enter the harbor, leads between shoals. Piers in the harbor have depths of 5 and 7 feet alongside.

Anchorage can be taken in 2 fathoms southeastward of piers. Vessels with a draft of 14 feet can anchor in the fairway, unprotected from southeasterly winds, about 1 mile southeastward of Pukavik, in 4 to 6 fathoms.

Pilots can be obtained at Karlshamn.

Provisions, fuel oils, and water are available in limited quantities.

Elleholm, a fishing harbor about 2 miles eastward of Pukavik, has a pier with a depth of 5 feet alongside. An approach fairway accommodating vessels with a draft of 14 feet leads to the anchorage.

Range beacons, 008°, lead through the fairway to the anchorage. The outer approaches lie between rocky shoals marked by buoys. Consult the chart for location of these dangers and the approach ranges.

Anchorage, sheltered, can be taken outside the harbor in about 3 fathoms, sand and clay. A stern mooring is necessary.

Pilots can be obtained at Karlshamn.

Gunnön (56°09'N., 14°47'E.), an islet about 1 1/2 miles eastward of Elleholm, is connected by a bridge to the mainland. An approach fairway, marked by buoys, leads to an anchorage off the eastern side of the islet. A nearby jetty, 150 feet long, has a depth of 15 feet alongside.

Vessels with a draft of 15 1/2 feet are accommodated in the fairway. Anchorage can be taken in 3 1/4 to 5 1/2 fathoms, clay.

Pilots can be obtained at Karlshamn.

Stilleryd is a village at the head of a bight about 1 1/2 miles eastward of Gunnön. An approach fairway leads from southward to a sheltered anchorage in about 3 fathoms, sand and clay. There are short jetties in the harbor with 4 and 7 feet alongside.

Karlshall, on an inlet southeastward of Stilleryd, has a short jetty with about 18 feet alongside. The Stilleryd fairway leads northeastward to the anchorage in 3 1/2 fathoms, mud.

Pilots for Stilleryd and Karlshall can be obtained at Karlshamn.

KARLSHAMN (56°10'N., 14°52'E.)

2B-25 Karlshamn, a commercial port, is situated at the head of a bight about 8 1/2 miles north-northeastward of Listershuvud. The port is sheltered on the western side by Starno peninsula, on the southeastern side by a group of islets and Tarno Island, about 4 miles southeastward.

NAVIGATION.—From a position on the coastal track (sec. 2-2), about 6 1/2 miles south-southeastward of Sandhammaren, a course of 034° for 47 miles leads to a position about 15 miles southeastward of Karlshamn. Thence a course of 337° for 13 miles leads to pilot grounds over a least depth of 14 fathoms.

WINDS-WEATHER.—The harbor is subject to sudden southeasterly squalls. See section 2B-6.

ICE.—The harbor is usually free of ice.

DANGERS IN THE APPROACHES TO KARLSHAMN.—Only those dangers close to the main approach fairway are described. Consult the chart for other hazards.

Enskar, a low, partly wooded islet marked by a stone beacon with a radar reflector, lies about 1 1/4 miles eastward of Starno. Rocky patches of less than 4 fathoms, marked

by buoys with radar reflectors, extend about one-half mile southward from Enskar.

Lakknallarna, rocky patches of less than 1 fathom, extend about 1 mile southeastward of Starno. A buoy with a radar reflector marks the southeastern extremity.

Alleskar, a rock above water, lies about one-half mile eastward of Starno.

DEPTHS—DANGERS.—There are depths of 9 to 12 fathoms in the entrance between Starno and the southeastern extremity of the bight. The main approach channel leads through the entrance, over a least depth of 36 feet, into the harbor. Ships 600 feet long with a draft of 34 1/2 feet are accommodated. A narrow secondary channel leads close eastward of Alleskar and Boon Island into the harbor. Vessels with a draft of 23 feet are accommodated. A branch channel, in which vessels with a draft of 23 feet can enter the harbor, leads from the main channel about two-thirds mile eastward of Boon.

Numerous patches and shoals of less than 1 1/4 fathoms lie close to the channels. They are marked by lighted and unlighted buoys in accordance with the Swedish system.

LANDMARKS.—Ryssberg (sec. 2B-18), Hj-arthalla and Stibybacke (sec. 2B-19), and the towers on Hano island are prominent from offshore. Tarno appears as a high promontory. Closing the harbor, church steeples and a silo are seen in town.

2B-26 HARBOR.—The harbor extends about 1 1/2 miles within the entrance of the bight to the narrow inner harbor on both sides of the Mie River mouth. Its outer limits are bounded by Starno peninsula, Boon island, and Inre Ortholmen (56°09'N., 14°53'E.), at their southern extremities.

Boon Island lies close eastward of Starno. It is fringed by reefs closing the passage between the southern end of Boon and the mainland. A fairway, with a least depth of 27 feet, leads to a quay on Starno opposite the northwestern side of Boon. The fairway continues southward between shoals marked by buoys to a shipyard on Starno. There is a least depth of 11 1/2 feet in the fairway.

Kastellholmen (56°10'N., 14°52'E.), an island about one-half mile northward of Boon, is fringed by reefs on which lie islets

close eastward and southwestward. Breakwaters extend from the island and southwestern islet to the main channel opposite Sutudden. A beacon stands near the southern side of Kastellholmen.

Sutudden is a point on Starno about 300 yards southwestward of Kastellholmen. A breakwater extends eastward from the point. The main entrance channel leads between the breakwaters into the outer harbor, where there are depths of 16 to 36 feet, mud, sand and clay. The opening between breakwater heads is about 330 feet wide.

The inner harbor is about 200 yards wide at the entrance and about 20 feet deep. A short mole extends southward from the southeastern side of the harbor. The harbor shoals to 15 feet inside the entrance, and is quayed throughout.

The shores on the eastern side of the harbor and southeastward to the entrance are fringed by reefs and detached 3-fathom patches marked by buoys. Inre and Yttre Ortholmen are islets lying on the reefs within the eastern entrance.

Submarine cables are laid between Kastellholmen and the shore northeastward, also between Boon, Starno and the eastern shore. Inre and Yttre Ortholmen have power cables laid eastward.

A Degaussing Range lies about 100 yards northward of Kastellholmen. Beacons mark the sides of the range, illuminated by floodlights at the eastern and western ends. Vessels with a draft of 26 feet can be degaussed in a depth of 28 feet.

Mines are laid in an area between Kastellholmen, Sutudden, the southern end of Boon, and the eastern entrance of the bight. See sec. 1-109.

AIDS TO NAVIGATION.—Ortholmen Light is shown from the southwestern side of Inre Ortholmen. Vagga Sodra Light is shown from the southern extremity of Yttre Ortholmen. Lights are shown from the breakwater heads and from the southwestern corner of the molehead.

Lights in range, 338°, lead through the approach fairway into the harbor.

Lights in range, 318°, shown at Sutudden, lead from the approach channel through the fairway close southward of the breakwaters.

Lights in range, 206°, lead through the fairway westward of Boon to Vindhamn.

2B-27 PILOTS.—There is a pilot center (station) at the root of the mole in the inner harbor. Pilots can be obtained seaward of Lakknallarna (sec. 2B-25), during the day or night. With prior notice and good visibility, pilots will board ships on signal off Hano and Tarno islands. Entry or departure is by daylight only.

ANCHORAGE.—Anchorage, sheltered from all winds, can be taken in 6 fathoms, clay, westward of Kastellholmen. Anchorage can also be taken northward of Boon in 6 1/2 fathoms, clay and sand. Small vessels can anchor in 4 fathoms, clay, at Vindhamn, an anchorage between Boon and the shipyard.

Vessels seeking shelter must anchor westward of Kastellholmen. Permission is required to remain at the anchorage over 24 hours.

DIRECTIONS.—When about 3 miles south-southeastward of the entrance, steer 339°, with Karlshamn Church (56°10'N., 14°52'E.), observed between Kastellholmen and Ortholmen Light. When the Sutudden range is aligned 318°, change course and steer on the range until close southward of the breakwater entrance.

At night steer 338° on the entrance range through the approach fairway until the Sutudden range bears 318°. Thence proceed as previously directed or continue eastward of Kastellholmen on course 338°. When clear of the degaussing range, change course to pass close southward of the molehead.

2B-28 KARLSHAMN, with about 12,000 inhabitants, is situated at the entrance of the Mie River. It is a port of entry. The largest oilcake mill in Sweden and extensive granary facilities are located in town.

Exports include granite, cattle fodder and meal, vegetable oils, pit-props and lumber.

Imports include copra, oil-seeds, coal, petroleum, copper, and cotton.

BERTHS.—The harbor has about 7,000 feet of quayage with depths of 15 to 36 feet alongside. Most of the quays have railroad connections. Numerous cranes with capacities of 3 to 15 tons are available.

Ocean Quay is 492 feet long with 31 to 33 feet alongside. East Quay and West Quay are about 1,970 and 1,800 feet long, with 15 to 19 and 15 to 28 feet alongside, respectively. Soya Quay and Timber Quay, about 850 and 560 feet long, respectively, have 28 feet alongside.

The Oil Harbor at Sutudden has about 1,000 feet of berths. Vessels 630 feet long, with a draft up to 36 feet, can berth alongside. Vessels 600 feet long, with a draft of 30 feet, can berth at a 350-foot oil dock. Starno Quay, opposite the northern end of Boon, is 460 feet long with 20 feet alongside. Cranes of 12-tons capacity handle granite on the quay.

SUPPLIES.—Provisions, fuel and diesel oils, can be obtained. Water is piped to the quays. Tugs are available, including an ice-breaking tug of 2,470 hp.

REPAIRS.—No repairs are made at the shipyard on Starno, opposite Vindhamn, where there is a marine railway capable of lifting 500 tons. A crane of 40 tons capacity is available. There is a lumber quay 525 feet long with 16 1/2 feet alongside at the former shipyard.

COMMUNICATIONS.—Karlshamn is connected with the Swedish railroad system. There are shipping services to Stockholm, Goteborg, Kobenhavn, and German ports.

DERATTING.—See section 1-4.

MEDICAL.—There is a hospital in town.

COAST (Continued)

2B-29 Between Karlshamn and Gollandet, about 15 miles eastward, the coast is indented by several bights, fronted by rocks, reefs and islets. Channels between these dangers lead to anchorages and fishing harbors. Local knowledge is necessary.

A gunfiring range between Karlshamn and Gollandet extends about 7 miles offshore.

A protected area encloses the coast and seaward approaches from a point about 3 miles eastward of Karlshamn to Torhamnsudde (56°05'N., 15°51'E.), including the islands of Tarno and Utlangan. Vessels within the area must remain in pilotage channels.

Local Magnetic Disturbances are reported off this coast.

Vagga, a fishing harbor formed by two pairs of breakwaters, is located within a promontory about 1 1/4 miles southeastward of Karlshamn. There is a 300-foot concrete quay in the harbor with 13 feet alongside, and about 460 feet of wharfe with 10 to 13 feet alongside. A fairway, leading into the southern entrance between breakwaters, will accommodate vessels with a draft of 12 feet. A branch fairway, for vessels with a draft of 10 1/2 feet, leads from the western entrance to the Karlshamn fairway.

A light is shown from the harbor.

Pilots can be obtained at Karlshamn.

Vetekulla, a fishing harbor about 2 miles eastward of Karlshamn, has a wharf with about 12 feet alongside. An approach fairway, in which vessels with a draft of 11 1/2 feet can enter the harbor, leads from the Karlshamn fairway northeastward of Enskar (sec. 2B-25). Anchorage in about 3 fathoms, sand, is available in the harbor.

Matvik is a shipping harbor about 1 1/2 miles eastward of Vetekulla. Vessels with a draft of 10 feet can enter the harbor and berth alongside a pier. A fairway, accommodating ships with a draft of 27 feet, leads from the Karlshamn approach to the anchorage close southward of Matvik. A southeastern fairway will accommodate vessels of 24-foot draft. Anchorage can be taken in 5 to 7 1/2 fathoms, clay, with ample room for several vessels. Pilots can be obtained at Karlshamn.

Matvikshog, a prominent mast beacon, stands on a hill about one-half mile northward of Matvik. It is a clearing mark for the anchorage and fairways.

Tarno Island (56°07'N., 14°58'E.), about 2 1/2 miles southward of Matvik, has sloping sides, a bare top, and appears as a high headland from the offing.

A light is shown and a fog signal sounded near the southern extremity of the island. A light is shown from the northeastern promontory.

Tarno Harbor, a fishing harbor on the northern side of the island, is approached by a fairway leading around the northeastern promontory. Dangers adjacent to the fairway are marked by buoys. A wharf in the harbor has 11 1/2 feet alongside. Anchorage, sheltered from all winds, can be taken in 5 to

5 1/2 fathoms, sand and clay, close northward of the harbor. Pilots can be obtained at Karlshamn.

Guovik, a harbor about 5 1/2 miles eastward of Karlshamn, has two loading jetties with 7 1/2 and 8 1/2 feet alongside. Vessels with a draft of 17 1/2 feet can anchor off the harbor. Pilots can be obtained at Karlshamn.

Jarnavik (56°11'N., 15°05'E.), a harbor about 7 miles eastward of Karlshamn, has a jetty with 10 feet alongside. Vessels with a draft of 9 1/4 feet are accommodated. Mines have been laid between 1 1/4 and 2 miles southward of Jarnavik. Pilots can be obtained at Karlshamn.

Bjarnovik and Edstorp are harbors near Jarnavik. There is a jetty in each harbor with a depth of 7 feet alongside. Anchorage can be taken in 3 fathoms, mud, off both harbors. Pilots can be obtained at Karlshamn.

RONNEBYHAMN (56° 11'N., 15°18'E.)

2B-30 Ronnebyhamn, a commercial port about 15 miles eastward of Karlshamn, is situated at the mouth of the Ronneby River. The harbor, at the head of a bight, is fronted by numerous islets and shoals, incompletely surveyed.

NAVIGATION.—From a position on the coastal track (sec. 2-2), about 6 1/2 miles south-southeastward of Sandhammaren, a course of 034° for 58 miles leads to the pilot cruising grounds over a least depth of 14 fathoms.

WINDS—WEATHER.—Fresh to strong westerly winds may cause the water level in the harbor and approaches to drop about 3 feet.

ICE.—Ice in normal winters seldom impedes shipping. In severe winters ice hinders traffic during February and March.

CURRENT.—At times, a considerable outflow from the Ronneby River can adversely affect the maneuvering of vessels in the approaches to port. The current sets in a direction similar to that of the river.

DANGERS IN THE APPROACHES TO RONNEBYHAMN.—Only those dangers close to the approach channels are described. Consult the chart for other hazards.

Gasfeten, a high yellow-colored rock, lies about 4 1/2 miles southwestward of the har-

bor. Sommargrund, a 2-fathom patch marked close eastward by a buoy, lies about 1 mile southwestward of Gasfeten. Slanakullen, a 1 3/4-fathom patch marked close southward by a buoy, lies about 1 mile southward of Gasfeten. Fittjakullen, a 1-fathom patch marked close eastward by a buoy, lies about one-half mile westward of Gasfeten.

Between Gasfeten and the harbor several patches of 2 1/2 and 3 fathoms lie close to the western channel. Buoys mark these dangers. Eskelen, an above-water rock, lies on the edge of the channel about one-half mile northward of Gasfeten.

Stora Ekon and Dunson are islets lying about 1 mile and 1 3/4 miles northward of Gasfeten. A 1-fathom patch, marked by buoys, lies at the edge of the channel opposite the southern end of Dunson. A 3 1/4-fathom patch lies in the fairway northward of Dunson and a lighted buoy is moored close westward.

GOLANDET peninsula, about 3 miles southward of Ronnebyhamn, is fringed by rocks and reefs extending westward and northward to the edge of the eastern channel. Buoys mark these dangers. Numerous patches of less than 1 1/2 fathoms, marked by buoys and perches lie close to the channel.

DEPTHS—DANGERS.—The western approach channel leading westward of Gasfeten and northeastward of Dunson has a least depth of 21 1/4 feet. Vessels with a draft of 20 feet are accommodated. The eastern approach channel leading westward of Golanget has a least depth of 19 feet. Vessels with a draft of 16 1/2 feet are accommodated.

From a junction of the approach channels northward of Golanget, the entrance channel leads in a depth of 21 1/4 feet into the harbor. There is a depth of 6 feet in the river between Ronnebyhamn and Ronneby, 2 1/2 miles upstream. Vessels with a draft of 5 feet can proceed to Ronneby.

In the western channel, Eskelen and the patches westward and northward of Dunson must be carefully avoided. In the eastern channel, Ellebaden Surf, between one-half and 1 mile southward of the western extremity of Golanget, must be avoided.

Dangers in the approaches to port are marked in accordance with the Swedish system of buoyage.

LANDMARKS.—A standpipe in Ronneby is a prominent landmark.

HARBOR.—The harbor, at the entrance of the river, is approached through a channel about one-half mile long. Buoys mark the sides of the channel leading to quays. Shoals of less than 2 fathoms lie adjacent to the channel.

REGULATIONS.—Ronnebyhamn lies within the Protected Area (sec. 2B-29). Foreign vessels must berth at the Harbor Wharf, lacking special permission, if the stay in Ronnebyhamn does not exceed 24 hours. For foreign ships loading or discharging cargo, a maximum of 7 days is allowed in port, including transit time in area.

Submarine cables are laid between Stora Ekon, the islets of Haron, Karon and the mainland. The port and town are connected by cables laid in the river. Notice boards mark the landing places.

Mines are laid in an area between the western extremity of Golanget, Haron Islet about 1 1/4 miles northwestward, and the northern extremity of Golanget. Anchoring is prohibited. The approach channels through the area should not be used during a thunderstorm.

2B-31 AIDS TO NAVIGATION.—A light and radar reflector is shown from Gasfeten. Lights in range, 018°, lead through the approach fairway westward of Gasfeten. Lights in range, 029 1/2°, lead through the fairway northward of Gasfeten and westward of Dunson.

A light is shown from the southern extremity of Steko, an islet about one-half mile eastward of Haron. Lights in range, 087°, lead southward of Steko to the junction of the eastern and western channels.

A light at Sandviken (56°10'N., 15°19'E.), southeastward of the harbor, leads to the entrance channel. Lights in range, 358°, lead through the entrance channel to the quays.

Cairn Beacons, striped or banded, standing on various islets, are used as clearing marks in the channel reaches.

PILOTS.—Pilots are requested by radio or radiotelephone from pilot centers (stations) at Karlshamn or Karlskrona. See sections 2B-27 and 2B-35 for information relating to boarding of pilots.

ANCHORAGES.—Anchorage can be taken in 4 1/2 to 6 fathoms, mud, northward of Stora Ekon. Foreign vessels must anchor here.

Sheltered anchorage can be taken in about 5 fathoms, mud, one-half mile eastward of Steko Light and westward of the approach channel.

Vessels can anchor in 3 fathoms, mud, about 500 yards southward of the quays. It is prohibited to anchor in fairways and on range alignments.

DIRECTIONS—WESTERN CHANNEL.—When about 3 miles south-southwestward of Gasfeten, steer 018° on the approach range, passing eastward of Eskelen. Thence steer 029° on the Svanvik Range, passing between the buoyed dangers westward of Dunson, until Steko Light bears 066°. Steer on this bearing until a range on the mainland, eastward, is aligned 087°. With this bearing as a course, steer in the buoyed channel southward of Steko. When Sandviken bears 032°, change course and proceed to the entrance channel on this bearing. Steer 358° on the entrance range into the harbor. At night, close attention must be given to white sectors of lights covering fairways.

EASTERN CHANNEL.—Local knowledge is necessary. From the buoy marking the outer shoals a midchannel course between buoys leads into the harbor.

2B-32 RONNEBY, with about 15,000 inhabitants, is situated on the river about 2 1/2 miles above the entrance.

Ronnebyhamn, at the entrance, is a Customs port.

Exports include steel plate, pit props, pulpwood, and cartons.

Imports include oils, coke, cement, chemicals, iron, zinc, and asbestos.

BERTHS.—There is over 1,600 feet of quayage, with about 1,100 feet having a depth of 21 1/4 feet alongside. Ships with a draft of 20 feet can berth. The remainder of the quayage has 14 to 16 1/2 feet alongside. Quays at Ronneby have about 6 feet alongside. All berths are connected by railroad. Several cranes with capacities up to 16 tons are available.

SUPPLIES.—Provisions and fuel oils are available. Water is piped to the quays. Tugs are available.

REPAIRS.—Minor repairs can be made to machinery.

COMMUNICATIONS.—The harbor and town are connected with the Swedish railroad system. There are shipping services to Stockholm, Goteborg, Oslo, Kobenhavn, and Hamburg.

DERATTING.—See section 1-4.

MEDICAL.—There are hospitals at Karls-hamn and Karlskrona.

COASTAL FEATURES—LANDMARKS (Continued)

2B-33 Between Golandet and Torhamn-sudde (56°04'N 15°51'E.), a point about 19 miles eastward, the irregular coast is partly wooded with low, rocky hills rising inland. Numerous islets, rocks, reefs, and several islands front the coast. Detached patches, some marked by buoys, lie seaward of the outer islands and islets.

Karlskrona is the only important port on this coast. The few fishing harbors and local anchorages are approached through intricate channels. Local knowledge is required.

This coast and offshore islands lie within the Protected Area (sec. 2B-29). Foreign vessels must not enter fairways leading to anchorages, or anchor within the Protected Area, without special permission.

A gunfiring range between Ronneby and Karlskrona extends about 10 miles southward of each port.

Local Magnetic Disturbances are reported off this coast.

Kuggeboda (56°09'N., 15°23'E.), is a sheltered anchorage about 2 1/2 miles north-eastward of the dark wooded Golandet peninsula. Vessels with a draft of 19 1/2 feet can anchor in 4 1/2 fathoms, mud. Provisions, oil, and water are available.

Between Kuggeboda and Hasslo Island, about 2 1/2 miles southeastward, lie several reef-fringed islets and many detached shoals. A western approach channel, for vessels with local knowledge, leads eastward between buoyed dangers to Karlskrona. Beacons, used as leading and clearing marks, stand on islets near the fairways. Hyperionsgrund, a 2-fathom patch marked by a buoy, lies

about 2 miles southeastward of Gollandet and at the outer end of the western approach channel.

Hasslo is one of four low islands fronting Karlskrona. Reefs and isolated patches extend about 2 miles seaward from the island. Buoys mark the outermost patches. Lights for fishermen are shown at the northwestern side, and about one-half mile off the southwestern side of Hasslo.

Garpaviken is a fishing harbor formed by breakwaters on the southeastern side of Hasslo. A buoyed channel, 13 feet deep, leads from southward to the harbor, about 10 feet deep. Range lights lead through the fairway to the breakwater entrance. A light is shown from the head of the northern breakwater.

Aspo, an island about 1 mile eastward of Hasslo, lies on the western side of the main approach channel to Karlskrona. N. Bollo and S. Bollo are smaller islands lying between Aspo and Hasslo. Underwater obstructions close the passages between Aspo and Hasslo. Lights for fishermen are shown at the southwestern end of S. Bollo. Rocks marked by beacons, and detached patches of less than 3 fathoms marked by buoys, lie up to 2 miles southward of the islands.

Drottningskar Citadel (56°06'N., 15°34'E.), is a prominent landmark on the eastern side of Aspo. A light is shown from a pierhead near the citadel. Flackeken, a mast beacon atop an oak tree, stands about one-half mile northward of the pierhead.

Tjurko, an island about 1 mile eastward of Aspo, lies on the eastern side of the main approach channel. Kungsholmen islet lies close westward of Tjurko, opposite Drottningskar. A fort is prominent on the islet. A light is shown from the head of a short breakwater at the northern end of the islet.

Djupasund Bridge spans the narrow passage between Tjurko and Sturko, close eastward. An underwater obstruction closes the passage northward of the bridge. A light is shown from the western end of the bridge. A white sector of the light leads through a fairway, between buoyed dangers, northward to the bridge. Range Lights, shown close southward of Djupasund, lead to a fishing harbor.

Sturko, an island ranging about 3 1/2 miles southeastward of Tjurko, is identified from the offing by a high, church steeple on the southeastern side. Reefs, partially surveyed, extend about 1 1/2 miles offshore. Between the southern extremity of Sturko and Torhamsudde, about 5 miles eastward, lie several reef-fringed islands and islets. Fairways, marked by buoys, lead to anchorages between the islands. Local knowledge is necessary. Range Lights lead to a fishing harbor near the western extremity of Sturko.

Utlangan (56°01'N., 15°47'E.), is a low, barren island at the southeastern end of the archipelago fronting Karlskrona. Foul ground, marked by buoys close seaward, extends about one mile offshore. A light is shown from the southern extremity of the island, about 4 1/2 miles southeastward of Sturko.

Klotet, a reef awash, lies about 1 1/4 miles south-southeastward of Utlangan. A lighted whistle buoy, with a radar reflector, marks the reef.

Langoren is a wooded island about 1 1/2 miles north-northeastward of Utlangan and less than a mile from Torhamsudde. The eastern approach channel to Karlskrona leads northward and northwestward of Langoren between numerous islets and shoals. Buoys mark the sides of the various channel reaches and adjacent dangers. Local knowledge is necessary. Range lights on the northwestern and northeastern sides of Langoren lead through the approach channel.

KARLSKRONA (56°10'N., 15°36'E.)

2B-34 Karlskrona is a naval and commercial harbor situated in a bight about 10 miles eastward of Ronnebyhamn. Several islands and islets fronting the harbor afford shelter. The town is partly built on islands joined to the mainland.

NAVIGATION.—From a position on the coastal track (sec. 2-2), about 6 1/2 miles south-southeastward of Sandhammaren, a course of 044° for 64 miles leads to the Approach Lighted Whistle Buoy over a least depth of about 9 fathoms at the buoy.

WINDS—WEATHER.—See section 2B-6.

ICE.—The harbor is usually free of ice.

DANGERS IN THE APPROACHES TO KARLSKRONA.—Only those dangers near the main approach channel are described. Consult the chart for other hazards.

Between the Approach Buoy and Aspo, about 2 3/4 miles northward, lie several rocky, detached patches. Prejbaden, a 3 1/2-fathom patch marked by a buoy with a radar reflector, lies about 2 miles northwestward of the approach buoy. Asposten, a rock marked by a beacon, lies about 1 mile southward of Aspo and the same distance westward of the channel. Between Prejbaden and Asposten lie patches of less than 3 fathoms. Saltknolen, a 1 1/2-fathom patch marked by buoys, lies between Asposten and the channel. Allebaden, a rock awash and marked by buoys, lies close to the channel south-southeastward of Aspo.

Between the Approach Buoy and Tjurko lie several detached patches. Tjurkosten (56°05'N., 15°36'E.), a rock about 1 1/2 miles southward of Tjurko, is marked by a buoy. Esten, a rock awash and marked by a buoy lies between Tjurkosten and the channel. Several rocky patches of less than 1 fathom, marked by buoys, lie northwestward of Tjurkosten and less than one-half mile eastward of the channel.

Obstructions extend from Drottningsskar and Kungsholmen into the main channel. A light and a buoy mark the outer ends of the obstructions. Buoys mark patches of less than 1 1/2 fathoms lying close southward and northward of the obstructions.

DEPTHS—DANGERS.—There are least depths of 36 to 52 feet in the main approach channel. The entrance channel leading to the quays has depths of 23 1/2 to 26 1/4 feet. Vessels with a draft of 33 feet can approach the harbor and anchor in the outer roads. Vessels with a draft of 22 feet are accommodated in the entrance channel and commercial harbor.

Branch fairways converge on the main fairway between Aspo and Tjurko. The fairway westward of the main channel will accommodate ships with a draft of 23 feet; the fairway eastward, 16 1/2 feet.

The western approach channel (sec. 2B-32), leading into the harbor northward of Hasslo and Aspo, has a least depth of 15 3/4 feet. Vessels with a draft of 14 feet are accommodated.

The eastern approach channel (sec. 2B-32), has a least depth of 11 3/4 feet and can accommodate vessels with a draft of 10 1/2 feet.

Garskullen, a 1-fathom patch marked by a buoy with a radar reflector, lies close to the main channel northeastward of Aspo.

Getskar, an islet fringed by reefs about 1 mile southward of the town and close westward of the entrance channel, is marked by buoys. On the eastern side of the channel, about one-half mile northward of Getskar, lie buoyed patches of 2 3/4 fathoms.

Dangers and channels are marked in accordance with the Swedish system.

LANDMARKS.—A radio mast and standpipe in town are prominent, as is a grove of trees on southwestern Hasslo.

2B-35 HARBOR.—Karlskrona is a sheltered harbor, about 1 mile in extent. Several bridges connect the various parts of the city. Islets fringed by reefs, connected by 1 1/2-fathom shoals, lie close eastward and northward of the buoyed entrance channel.

Vamo (56°10'N., 15°36'E.), an island at the northeastern part of the harbor, has a pier on the southern end. A fairway leads in 16 feet to the pier. The entrance channel leads to quays lining the eastern and northern sides of town and to the oil pier, close northward.

There are extensive approaches between the harbor and the several fronting islands. The eastern and western fairways lead in the approaches northward of the islands, joining the main fairway close northeastward of Getskar. The Outer Roadstead lies between the northern sides of Aspo and Tjurko. There are depths of 4 and 4 1/2 fathoms in the approaches, with numerous rocks and patches marked by buoys.

Mines are laid between Aspo and Tjurko, also in the eastern and western channels at their seaward approaches. See sec. 1-109.

A gunfiring range extends between the mainland and Sturko. Pilots are notified of firing schedules.

Torpedo firing exercises are conducted on ranges between western Karlskrona, Tjurko, and Almo, an island northward of Hasslo. The ranges are marked by buoys and floats. Red flags are displayed from the floats during firing.

Submarine cables are laid between the mainland, Karlskrona, Hasslo, Aspo, Tjurko, and Sturko. Notice boards mark the cable landings.

AIDS TO NAVIGATION.—Karlskrona lighted whistle buoy, with radar reflector, is moored in the fairway about 2 1/2 miles southward of Aspo.

Lights in range, 012 1/2°, lead through the approach fairway. A light on Godnatt Fort, located 2 miles northward of Kungsholmen, bearing 015°, leads between obstructions extending from Aspo and Tjurko. Verko Light, about 1 mile eastward of Vamo pier, bearing 026°, leads from the Outer Roadstead to the entrance channel.

Laboratorieh Light is shown about 500 yards northeastward of the front (012 1/2°) range light. Lights in range, 300°, lead in the entrance channel to East Quay, close northward of a lighted buoy marking a 1 1/2-fathom patch.

PILOTS.—A pilot center (station) is located in Karlskrona. Pilots are stationed at the eastern side of Aspo (sec. 2B-33), where a watch is maintained. Pilots for the southern or main approach channel are obtained in the vicinity of the approach lighted whistle buoy. Pilots for the branch fairways eastward and westward of the main approach are obtained seaward of Tjurkosten and Asposten Shoals.

Ships bound for the western approach channel to port order pilots from Aspo or Karlskrona. Pilots are obtained seaward of the outer shoals. Ships bound for the eastern approach channel order pilots from Aspo or Bergkvara (56°23'N., 16°06'E.). Pilots are obtained seaward of the outer shoals off Langoren (sec. 2B-33).

The pilot station at Aspo provides 24-hour service whereas Bergkvara station provides pilots between 0600- and 1900-hours and on request after hours.

ANCHORAGE.—Ample, sheltered anchorage can be taken in 3 3/4 to 13 fathoms, mud, in the Outer Roadstead between the northern parts of Aspo and Tjurko. Anchorage can also be taken in 4 fathoms, mud, north-eastward of the harbor quays.

Anchorage for naval ships can be taken in 5 1/2 to 11 fathoms, southeastward of Getskar (sec. 2B-33), also between Getskar and the naval dockyards in 3 to 4 fathoms.

Anchorage, with local knowledge, can be taken off several loading places on the islands fronting Karlskrona. There are depths of 2 to 4 fathoms at the anchorages.

A prohibited anchorage about 1 1/2 miles long, marked by buoys, extends about one-half mile northwestward of Aspo.

DIRECTIONS.—From the approach lighted whistle buoy, steer 012 1/2°, keeping the white towers of the approach range in Karlskrona aligned. At night, the approach range lights, bearing 012 1/2°, leads in the fairway to a position about one-half mile southward of the obstructions extending into the main channel. Steer 015° for Godnatt Fort, keeping in the white sector of Godnatt Light, until abeam the eastern extremity of Aspo and Garskullen lighted buoy. Steer 026° for Verko Light, keeping in the white sector, until reaching the entrance channel north-eastward of Getskar. With Laboratorieh Light ahead bearing 334° steer through the channel passing eastward of the light. Thence steer 300° on the entrance range lights leading through the buoyed channel to the eastern quay.

Directions for the secondary western and eastern approach channels are not given, as these intricate approaches require local knowledge.

2B-36 KARLSKRONA, with about 34,000 inhabitants, is the seat of the local government and important as a naval base and commercial shipping harbor. It is a port of entry.

Exports include fish, granite, wooden wares and lumber.

Imports include various commodities, fuels, cattle feed, steel and machinery.

BERTHS.—East Quay, about 1,900 feet long, has 23 1/2 feet alongside. North Quay, about 880 feet long, has 19 1/2 feet alongside. South Quay, about 490 feet long, has 11 1/2 to 16 1/2 feet alongside. The T-head oil pier is about 165 feet long with 23 1/2 feet alongside. Deep-draft ships work cargo by lighter in the Outer Roads. The quays and oil pier have railroad connections. There are several cranes of 5 to 10 tons capacity on the quays and a 6-ton floating crane is available.

The Fishing Harbor, located at Salto on the western side of Karlskrona, has about

1,400 feet of quays with 13 to 19 1/2 feet alongside.

SUPPLIES.—Provisions can be obtained. Fuel oils and water are available at the quays. Tugs are available.

REPAIRS.—Major repairs can be made in the Navy Yard, where several drydocks are available for ships of 16,000 d.w.t. Numerous cranes are available, the largest of 100 tons capacity. Compasses are adjusted. The largest drydock has a maximum length of 607 feet, a breadth at the entrance of 68 feet, and a depth over the sill of 24 1/2 feet.

COMMUNICATIONS.—Karlskrona is connected with the Swedish railroad system. Radio facilities are available. There are local airports nearby. Shipping is conducted with many Swedish ports and with Norway, Denmark and Germany.

DERATTING.—See section 1-4.

Medical.—There is a hospital in Karlskrona.

2B-37 TORHAMNSUDDE (56°04'N., 15°51'E.), a bare point about 1 mile northeastward of Langoren, marks the eastern extremity of this coast. A church spire about 1 1/4 miles inland is prominent. Torhamn, a fishing harbor about 1 1/2 miles northwestward of the point, is formed by two breakwaters. A light is shown from the head of the eastern breakwater. A pier in the harbor has about 11 feet alongside. Vessels with a draft of 10 1/2 feet are accommodated in the approach fairway and at the pier. Local knowledge is necessary. Sheltered anchorage can be taken in 2 1/4 fathoms, mud, southwestward of Torhamn.

PART C. BORNHOLM AND CHRISTANSO

2C-1 Hammer Odde (55°18'N., 14°46'E.), is the low, sandy, northern extremity of Bornholm. Backed by steep cliffs, the point appears as a low island from afar and is difficult to distinguish at night. A light is shown from a hill backing Hammer Odde. Fog signals are sounded and a radiobeacon transmits at the light.

COAST—GENERAL

2C-2 The coast of Bornholm Island is steep except at the northern and southern

ends which are low and sandy. The coast, with only minor indentations, has no natural harbors. The only port of importance is Ronne, near the western end of Bornholm.

The terrain rises inland to a high point near the wooded center of the island. A prominent monument marks the point. Radio masts, marked by obstruction lights, stand about 2 1/4 miles from the monument. Anchorage and shelter can be taken under the lee of the island during stormy weather.

Local Magnetic Disturbances exist in the vicinity of Bornholm, especially off the northern and eastern extremities.

Bornholm is a good radar target at about 23 miles.

Christianso, about 14 miles eastward of the northern extremity of Bornholm, is a group of islets and rocks. Several towers and the walls of an abandoned fortress mark the group. The larger islets are inhabited by fishermen. Secure anchorage can be taken between Christianso and Frederikso, the two largest islets.

DEPTHS—DANGERS

2C-3 Bornholm is closely fringed by reefs and shoals which extend about 4 miles off the southwestern coast. In this area, foul ground lies about 26 miles farther southwestward. Generally, the 10-fathom curve follows the coast about one-half mile offshore. Depths increase rapidly to 30 fathoms about 2 miles off the northern and eastern coasts.

Christianso lies on a 20-fathom bank. The 5-fathom curve generally closes Christianso within 250 yards, with depths increasing to 10 fathoms close seaward of the curve. The sides of the bank are steep-to with greatest depths of 40 fathoms.

WINDS—WEATHER

2C-4 See section 2-3.

CURRENTS—WATER LEVEL

2C-5 See section 2-4. Normally, there are no tidal currents on the coasts of Bornholm or the Christianso islets. Predominant westerly and southwesterly winds produce a weak surface current. When fresh northwesterly winds blow off the northern end of Bornholm, strong currents setting southward are encountered.

Easterly winds raise the water level; westerly winds lower it.

COASTAL FEATURES—LANDMARKS

2C-6 Between Hammer Odde and Ronne, about 12 miles southward, the narrow fore-shore is backed by steep cliffs almost 300 feet high. The southern half of this coast is partly wooded, low and sandy in places.

Hammaren (55°17'N., 14°46'E.), the rocky northern part of Bornholm consists of a high, steep hill separated from Hammer Odde by a valley. A light is shown from the hill.

Hammerhavnen, a harbor formed by two breakwaters, lies at the head of a bight about one-half mile southwestward of Hammaren. The harbor has a depth of 13 feet. Silting to 11 1/2 feet occurs at times. A quay in the harbor has 14 feet alongside. Traffic signals are in force.

Lights are shown close eastward of the harbor and on the northern breakwater head. Powerful working lights in the nearby quarries should not be confused with Hammaren Light.

Anchorage can be taken in 6 or 7 fathoms, sand and gravel, in the bight. Large vessels can anchor in about 15 fathoms, sand, westward of the bight and abeam of Hammershus, a conspicuous ruin near a prominent resort hotel.

Pilots for Hammerhavnen can be obtained from Hasle, a harbor about 6 miles southward.

Vang, a fishing harbor about 2 miles southward of Hammaren, is formed by two breakwaters. The harbor consists of three basins. There is a depth of 10 feet in the two outer basins and 7 feet in the inner basin.

Range lights, shown when a vessel is expected, lead through the fairway to the harbor entrance. A light is shown from the head of the southwestern breakwater.

Pilots can be obtained ashore.

Supplies of water and provisions can be obtained.

Teglkas, a harbor about 2 miles southward of Vang, is formed by two breakwaters but is inaccessible with onshore gales. Outer and inner basins are 6 1/4 feet deep. North-easterly and southwesterly gales raise and lower the water level about 3 feet and 2 feet, respectively. A light is shown from the head of the eastern breakwater.

Rutskirke, a church with two towers, stands atop a high hill about 1 1/4 miles southeastward of Vang. The towers are seen about 32 miles offshore.

Helligpeder (55°13'N., 14°43'E.), a harbor about 1 mile southward of Teglkas, is formed by two breakwaters but is open to onshore gales. Two basins in the harbor are 4 to 5 feet deep. A light is shown from the head of the northern breakwater.

Hasle, a harbor about 1 1/2 miles southward of Helligpeder, has a sheltered harbor formed by two breakwaters. Westerly gales raise a sea outside the harbor. A foul area with a least depth of 2 fathoms, marked by buoys, lies about 330 yards west-northwestward of the harbor entrance. The harbor consists of an outer and two inner basins with depths of 12 and 14 feet, respectively. A channel, 14 feet deep, leads from the entrance to the inner harbor.

Range lights lead through the fairway to the entrance. Lights are shown from the heads of the eastern and western breakwaters and a fog signal is sounded at the latter when vessels are expected.

Anchorage can be taken in 10 or 12 fathoms about 1 mile outside the harbor.

Pilots can be obtained in the town.

Supplies of water and provisions are obtainable. Minor mechanical repairs can be made. There is a marine railway capable of taking vessels of 100 tons. A 15-ton crane is available.

Hvideodde is a sandy point about 4 miles southward of Hasle. Reefs and several rocky patches with a least depth of 1 fathom fringe the coast as far as 1 1/2 miles off Hvideodde. A buoy marks the outer edge of the shoal patches.

Submarine cables, marked by beacons at their landings, are laid from Hvideodde to Sweden (sec. 2A-19), and westward to Denmark.

Norre Kaas, a harbor close northward of Ronne, consists of outer and inner basins about 7 feet deep. A narrow channel leads in 7 feet along the eastern side of a northern breakwater into the harbor. A light is shown from the head of the breakwater.

RONNE (55°06'N., 14°42'E.)

2C-7 Ronne, at the western extremity of Bornholm, is the principal town and harbor on the island.

NAVIGATION.—From a position on the coastal track (sec. 2-2), about 7 miles southward of Sandhammaren, a course of 127° for about 19 miles leads to Ronne Approach Buoy over a least depth of 7 1/2 fathoms about 9 miles southward of Sandhammaren.

CURRENTS.—See section 2C-5. The water level at Ronne rises about 2 1/2 feet with easterly winds and falls about 3 feet with westerly winds.

ICE.—Ice impedes shipping in severe winters only. Normally, ice appears in the harbor late in January and disappears late in February.

DEPTHS—DANGERS.—There is a depth of 29 1/2 feet in the approach channel and harbor entrance. The fairway leading from the entrance between breakwaters to the inner harbor has a depth of 28 feet, shoaling to 26 1/4 feet close outside. Vessels with a draft of 23 feet can enter the harbor.

A reef extending southward between the northern breakwater and western mole has a least depth of 1 1/2 fathoms at its southern extremity. Another reef with a least depth of 1/2-fathom extends offshore from southern Ronne. A detached 2 1/4-fathom patch, marked by a buoy, lies near the outer end of the reef. A 2-fathom rocky patch, marked by a buoy, lies close northward of the harbor entrance.

LANDMARKS.—Ronne Church and Castle are conspicuous in town. Several mills and high chimneys are prominent.

HARBOR.—The sheltered harbor of Ronne, offering protection from storm and ice, is formed by two breakwaters with moles enclosing inner basins. The entrance is 262 feet wide between the breakwater heads. The outer harbor, eastward of the breakwaters, is 21 1/4 to 28 feet deep and is fringed by shoals marked by dolphins. The northern and southern harbors are 23 feet deep. Basins in these harbors are 19 1/2 and 10 feet deep, respectively. There is a 6-foot boat harbor at the root of the southern mole.

AIDS TO NAVIGATION.—Ronne Approach Lighted Whistle Buoy, with a radar reflector, is moored on the entrance range alignment about 2 miles southwestward of the breakwaters. Lights in range, 055°, are shown from the head of the western mole, near

the head of the southern mole, and in town. A radiobeacon transmits at the rear range light. A light is shown from the head of the northern and southern breakwaters. A fog signal is sounded at the latter light. A light is shown from the head of the southern mole.

PILOTS.—There is a pilot station near the root of the western mole. Pilots are obtained day and night in the vicinity of the approach buoy upon prior notice of arrival. A white light is shown from the western mole when pilots are available. Approaching vessels requiring a pilot must show a white light in addition to the navigational lights.

ANCHORAGE.—The rocky, uneven bottom in the Ronne area makes anchoring untenable.

DIRECTIONS.—From Ronne Approach Buoy steer 055° on the entrance range alignment, passing northwestward of the buoy marking the 2 1/4-fathom patch. This course leads through the entrance between breakwater heads into the outer harbor. Change course for northern or southern harbors or round moleheads to enter inner basins.

CAUTION.—The latest NEMEDRI should be consulted for the approaches to Ronne.

2C-8 RONNE, with about 13,000 inhabitants, is the chief port of Bornholm and a first port of entry.

Exports include granite, kaolin, dairy products, and earthenware.

Imports include coal, coke, fuel oils, timber, clay, and cattle feed.

BERTHS.—Sondre Pier, extending from the eastern side of the southern harbor, is about 1,180 feet long with 23 feet alongside. The mole opposite Sondre Pier has about 500 feet of berthage with 23 feet alongside. In the northern harbor there is at least 1,700 feet of quays. Basin quays have 13 to 19 1/2 feet alongside. A berth at the eastern face of the western mole is 525 feet long with 23 feet alongside. Many of the quays and piers have railroad connections. Several cranes with capacities of 1 ton to 30 tons are available.

SUPPLIES.—Provisions can be obtained. Bunker fuels are available alongside or by oil barge. Water is piped to the quays. Tugs are available.

REPAIRS.—General repairs to hull and machinery can be made. The largest marine railway is about 420 feet long; depth over the blocks aft, 16 feet, forward, 8 feet. Vessels of 350 d.w.t. are accommodated. Divers are available.

COMMUNICATIONS.—Harbor berths are connected with the island rail system. There are telegraph facilities with Denmark, Sweden, and the continent. There is an airport about 3 miles distant, and a regular shipping service with Kobenhavn.

DERATTING.—Deratting certificates are issued.

MEDICAL.—There is a hospital in town.

COASTAL FEATURES—LANDMARKS (Continued)

2C-9 Between Ronne and Dueodde (54°59' N., 15°05'E.), the southwestern coast of Bornholm ranges about 15 miles east-south-eastward. This coast consists of steep bluffs, and many small points backed by woods. Coastal reefs and shoals extend 1 mile to 5 miles offshore. Rocky patches of less than 2 fathoms, marked by buoys, lie on the shoals.

Ronne Banke, lying between Ronne and Dueodde, extends southwestward for about 18 miles. The bottom is rocky and uneven for about 5 miles offshore, becoming clean and sandy with depths of 6 to 11 fathoms. The eastern side of the bank is steep at 8 to 22 fathoms; the western side slopes gradually. Fresh to strong westerly and southerly winds raise heavy seas on the bank.

Adlergrund, extending about 6 miles southwestward of Ronne Banke, has depths of less than 6 fathoms, with rocky patches of 2 1/2 fathoms. A bottom of sand and stones covers large rocks.

A lighted buoy is moored in 54°42'N., 14°12'E., about 4 miles southwestward of Adlergrund.

Submarine cables are laid from a bight about 2 miles southward of Ronne, across Ronne Bank and Adlergrund to Rugen Island, E. Germany. Another cable is laid from the bight, southeastward to Poland.

Arnager is a fishing harbor about 5 miles from Ronne. The harbor is fronted by reefs and shoals for about 4 miles offshore. A detached 2 3/4-fathom shoal, marked by

a buoy close southeastward, lies about 5 miles southward of Arnager. The harbor consists of a basin about 5 to 7 feet deep, with a pier having the same depths alongside. Range lights lead through the fairway to the pier. Anchorage can be taken by vessels with a draft of 13 feet, sand, close eastward of the basin. Southerly winds raise a sea.

An aeronautical radiobeacon, about 1 mile eastward of Arnager, is marked by an obstruction light. The center of an explosives dumping area lies about 6 miles westward of the beacon and about 4 miles offshore.

Raghammer Odde (55°01'N., 14°56'E.), about 5 miles from Arnager, is a point fronted by reefs extending 1 mile offshore. Between the point and Arnager is a bight where sheltered anchorage can be taken in 2 1/2 to 5 fathoms, sand and stones. Boderne, a fishing harbor 3 feet deep, about 1 mile westward of the point, is protected by a mole.

A gunfiring range, based at Raghammer Odde, is marked by beacons and an observation tower. A light is shown from the tower and a red ball is displayed from each beacon during firing exercises. The firing range extends about 7 1/2 miles offshore.

Bakkerne Havn, a fishing harbor about 3 miles from Raghammer Odde, is formed by a mole. There is a depth of 3 feet in the harbor and alongside a pier 130 feet long. Range lights lead into the harbor. Anchorage, with offshore winds, can be taken southeastward of Bakkerne Havn in 9 to 11 fathoms, good holding ground.

Dueodde (54°59'N., 15°05'E.), the southern extremity of Bornholm, is low and sandy. The shallows fronting Dueodde drop abruptly to 7 and 9 fathoms about 1 1/4 to 2 1/2 miles offshore. Anchorage, protected from northerly and northwesterly winds, can be taken in 6 to 8 fathoms, sand, close eastward of Dueodde. A swell may prevail.

A light is shown from Dueodde. Two fog signals are sounded alternately at the light. A disused light tower stands about 3/4 mile northward of Dueodde. Both light towers are prominent.

2C-10 Between Dueodde and Svanke, about 9 miles north-northeastward, the eastern

coast of Bornholm is rocky, backed by cliffs in the northern part. A reef closely fringes the coast inside the 10-fathom curve. Buoys mark the eastern edge of a 1 1/4-to 2 1/4-fathom reef, extending about 1 1/4 miles offshore, northeastward of Dueodde.

Snogebaek, a fishing harbor about 3 miles from Dueodde, is formed by two breakwaters. The harbor consists of a basin, 5 feet deep, about 100 yards offshore and connected to it by a pier with 5 feet alongside. Range lights lead to the pier. A submarine cable is laid from Snogebaek to the Latvian coast.

Nekso (55°04'N., 15°09'E.), a harbor about 2 1/4 miles northward of Snogebaek, is formed by a mole and detached breakwater. The sheltered harbor consists of three basins with depths of 10 to 16 feet. Storm gates at the entrance are closed in heavy weather. Northeasterly winds raise, southwesterly winds lower, the water level between 1 foot and 2 feet in the harbor and along this coast. Onshore gales cause an outgoing current at the harbor entrance which may attain a rate of 1 1/2 knots.

Range lights lead in the approach fairway, between the parallel breakwater and mole, into the harbor. A light is shown from the northeastern end of the breakwater and another light is shown from the head of a breakwater located close eastward. A fog signal is sounded at the latter light.

By day, a black ball is displayed at the entrance when the harbor is closed. At night, three red lights, vertical, replace the ball.

Anchorage can be taken in about 7 or 8 fathoms, in good but rocky and uneven holding ground, one-half mile off the harbor. This anchorage is the most frequented by large vessels off the eastern coast of Bornholm.

Pilots can be obtained outside the breakwater. The signal for a pilot is one long blast on the whistle or siren.

Supplies of water, provisions, and bunker fuels are available. Several cranes, the largest of 4-tons capacity, are available on the quays. Railroad connections lead to the quays. Tugs are available.

Minor repairs are made at the shipyard where there is a drydock 177 feet long, 31 feet wide, and 12 1/2 feet deep over the

sill. There are marine railways, the largest with a lifting capacity of 200 tons. Divers are available.

A regular shipping schedule is maintained with Kobenhavn, Denmark.

Arsdale, a sheltered fishing harbor formed by a mole, lies at the head of a bight about 2 1/2 miles from Nekso. In the harbor, outer and inner basins are 8 to 9 3/4 feet deep with 10 3/4 feet at the harbor entrance. Range lights lead between rocks in the approach to the harbor entrance of the mole-head.

Anchorage can be taken in 4 1/2 to 6 fathoms, good holding ground, southward of Arsdale.

Provisions, water, and bunker fuels are available.

SVANEKE (55°08'N., 15°09'E.), a harbor at the northeastern extremity of Bornholm, lies at the head of a small bay formed by three rocky points. A breakwater, northward of the harbor entrance, extends southeastward. An outer boat harbor is 5 feet deep. The entrance and outer harbor is 14 1/2 feet deep; the inner harbor 11 1/2 feet deep. A storm gate between the harbors is closed in heavy weather.

Range lights lead through the entrance to the outer harbor. Lights are shown from the head of the breakwater and close southward. Sandkaas Odde Light is shown from a point on the southern end of Svaneke. A fog signal is sounded at the light.

CAUTION.—Rocks, with a depth of 1 3/4 fathoms, lie about 200 yards off the southeastern shore of Svaneke. The entrance range is aligned only after these rocks have been cleared.

Svaneke has port closing signals similar to those for Nekso.

An explosives dumping area lies about 4 miles southeastward of Svaneke.

A Measured Mile is marked northward by Sandkaas Odde Light and southward by mast beacons on the shore.

Anchorage can be taken in 5 to 7 fathoms about 1 mile southward of Svaneke and 2 miles offshore. Small vessels can anchor in 3 fathoms, good holding ground, within 300 yards off this coast. Onshore winds raise a heavy sea.

Pilots can be obtained by day from Svaneke. Supplies of provisions, water and bunker fuels are available.

Minor repairs can be made. There is a marine railway with a lifting capacity of 70 tons, and a 3-ton crane.

A shipping service is carried on with Hasle and Kobenhavn.

2C-11 Between Svaneke and Hammer Odde, about 17 miles northwestward, the coast is rocky, with narrow beaches backed by high, steep cliffs. Sorteodde (55°13'N., 14°58'E.), a salient point, is located midway along this coast. A submarine cable is laid between Svaneke and Christianso.

The coastal bank is steep with the 10-fathom curve about one-half mile offshore. Between the coast and the 20-fathom curve, about 1 mile to 3 miles offshore, the bottom is sandy. There are no detached dangers.

Listed, a sheltered harbor about 1 mile northwestward of Svaneke, is formed by breakwaters. Four basins in the harbor are 7 to 9 feet deep. Easterly and westerly winds raise and lower the water level about 2 feet, respectively. Range lights, westward of the harbor entrance, lead clear of reefs. Local knowledge is necessary. A light is shown from the head of the western breakwater.

Bolshavn, a fishing harbor about 2 1/2 miles from Svaneke, is formed by two breakwaters. There is a depth of 4 feet in the entrance and 3 feet in the harbor. Anchorage can be taken in about 8 fathoms outside the harbor, protected from westerly and southwesterly winds.

Melsted (55°12'N., 14°59'E.), a harbor about 7 miles from Svaneke, is formed by moles. A buoyed channel, 6 feet deep, leads into the harbor between moleheads. The harbor is 5 1/4 feet deep. Range lights lead through the entrance channel. Local knowledge is necessary. Anchorage can be taken in 5 to 7 fathoms, sand, southeastward of the harbor. Supplies of water, provisions and fuel oil can be obtained.

Gudhjem, a fishing harbor close eastward of Sorteodde, is formed by outer moles with wave shields. The harbor consists of three basins, 8 to 14 feet deep, with 15 feet in the narrow harbor entrance. Vessels with a draft

of 12 feet are accommodated. A storm gate can be closed between the outer and middle basins. Southwesterly storms may lower the water level about 1 1/2 feet.

Range lights lead through the entrance channel into the outer harbor. A local pilot can be obtained.

Supplies of water and provisions can be obtained at a pier in the middle basin. A crane of 5-tons capacity is available on the pier. There is a marine railway with a lifting capacity of 20 tons. A ship service is maintained with Kobenhavn and Hasle.

Norresand (55°13'N., 14°58'E.), a fishing harbor close northwestward of Gudhjem, is formed by two moles. The harbor basin and entrance are 11 to 12 feet deep, respectively. Vessels with a draft of about 10 feet can be accommodated in the approach fairway and harbor. Northeasterly and southwesterly winds raise and lower the water level about 2 feet, respectively.

Range lights lead between moleheads into the harbor. Anchorage, with offshore winds, can be taken in 5 to 6 fathoms in the bight about one-half mile northwestward of the harbor. A local pilot can be obtained for Norresand. Water, provisions, and fuel oil are available.

Tejn, a sheltered fishing harbor about 5 miles from Norresand, is formed by moles and a breakwater. The harbor consists of two basins, 7 to 8 feet deep approached through an entrance about 9-feet deep. Vesthavn, a western basin is 13-feet deep with an entrance 13 3/4-feet deep.

Rocky patches of less than 1 fathom lie in the harbor approach. Range lights lead through the approach fairway to the breakwater. A fog signal is sounded at the front range light.

Anchorage, with offshore winds, can be taken in 6 to 7 fathoms about one-half mile northward of the harbor. Pilots are local fishermen.

Water and provisions are available. There is a marine railway capable of lifting 20 tons.

Allinge, a harbor about 2 miles from Tejn, is formed by two moles. Outer and inner harbor basins are 15 1/2 and 14 1/2 feet deep, respectively. The entrance between moleheads is 15 1/2 feet deep. Vessels

with a draft of 13 feet can enter the inner basin. Northeasterly and southwesterly winds raise and lower the water level about 3 feet, respectively.

Range lights lead through the approach fairway to the entrance. A light is shown from the northern molehead.

Anchorage, with offshore winds, can be taken in over 5 fathoms about one-half mile offshore. A storm gate closed between basins makes it possible to anchor in the inner basin during onshore gales. Pilots can be obtained in town.

Water, provisions and fuel oil are available. Cranes, the largest of 20-tons capacity, are on the quays. Minor repairs can be made. A shipping service is maintained with København and Hasle.

Sandvig, a harbor less than one mile from Allinge is formed by a breakwater and mole. The harbor, 5 feet deep, is divided into two basins by the mole. Entrance, with local knowledge, cannot be accomplished with onshore gales.

Range lights lead through the entrance fairway, clear of a rock about 1/4 mile seaward of the entrance.

Anchorage, with offshore winds, can be taken in 5 to 6 fathoms in a bight adjacent to Sandvig and close southeastward of Ham-maren (sec. 2C-6).

CHRISTIANSO (55°19'N., 15°11'E.)

2C-12 Christianso (sec. 2C-2), lies about 10 miles northeastward of Sorteodde. The islets of Christianso, Frederikso, Graesholm, and Tat, with several surrounding rocks make up this group. Landmarks include a large, roofless tower on the southeastern side of Christianso islet and the tower with a pointed roof on the northern side of Frederikso.

Rocky shoals and reefs surround the islets (sec. 2C-3), extending about 400 yards off-

shore in places. Beacons mark the alignment of these dangers but local knowledge is required. A 15-fathom bank lies about 1 mile northwestward of Tat, the northern islet. An Explosives Dumping Area and a wreck lie near the bank. A dumping area for explosives, about 16 miles square, lies eastward of the islet group.

Currents (sec. 2C-5), in the various passages between the islets, run with considerable velocity during stormy weather. Current direction is governed by Baltic winds.

Christianso Harbor, in the sound between Christianso and Frederikso, is divided by a bridge into northern and southern parts. The bridge, connecting the islets, can be opened to allow vessels with a draft of 13 feet to enter the harbor. There are depths of 9 to 27 feet in the harbor. The entrance of the southern harbor is 15 feet deep. Wharves, with 10 feet alongside, are located along the eastern side of the southern harbor, which is formed by short moles. Vessels in the northern harbor make fast to rings secured to the cliffs. A submarine cable from Bornholm is landed inside the southeastern mole of the southern harbor.

A light is shown from Christianso. Fog signals are sounded nearby. A light is shown and a fog signal sounded near the bridge on Frederikso. White sectors of the light lead through the northern and southern approach fairways and entrance of the harbor. Three red lights, vertical, are shown close southward of the bridge when the harbor is closed. A light is shown from Tat.

Sheltered anchorage for small vessels can be taken in the harbor.

There is a pilot station at Christianso. Pilots can be obtained close seaward of the entrance fairway.

Supplies of water, provisions and fuel oil are available.

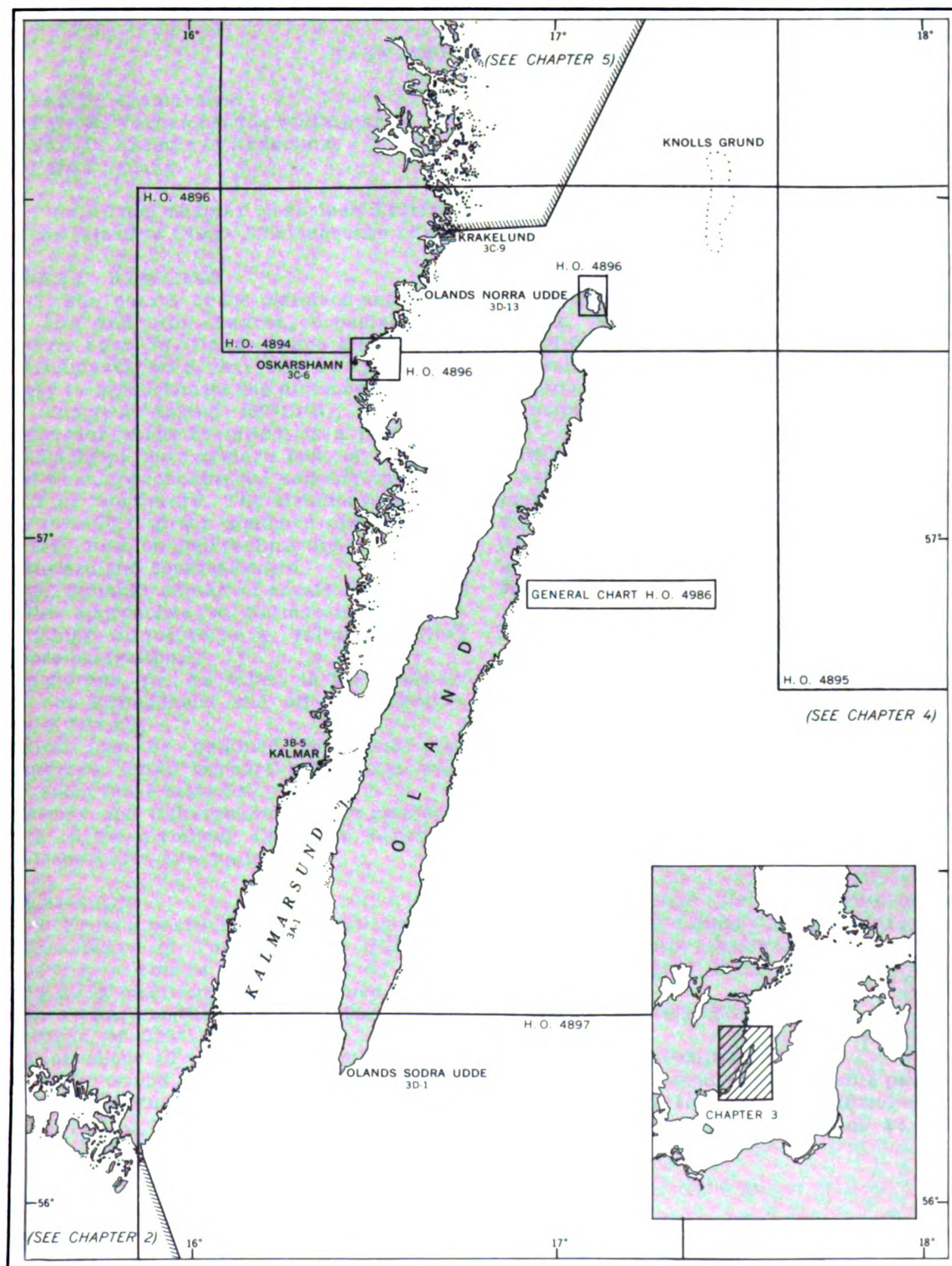


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
 Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 3—GRAPHIC INDEX

CHAPTER 3

KALMARSUND AND OLAND

- Part A. Kalmarsund
- Part B. Torhamnsudde to Kalmar
- Part C. Kalmar to Krakelund
- Part D. Oland

Plan.—This chapter describes Kalmarsund and Approaches, the contiguous mainland, and the island of Oland. The sequence of description is from south to north.

GENERAL REMARKS

3-1 The coasts of the mainland and Oland are low and often barren, especially the eastern coast of Oland, where the absence of landmarks on a very low coast makes it easy to overestimate the distance offshore. Bla Jungfrun Island (57°15'N., 16°48'E.), visible for about 25 miles, is a prominent landmark in the northern part of Kalmarsund when approaching the sound from northward or southward. The lighthouse (56°12'N., 16°24'E.) at the southern end of Oland is first seen on approaching the sound from southward and southeastward.

The variable depths of shoals and patches in the approaches to Kalmarsund indicate soundings in fog to be a valuable adjunct to safe navigation.

Anchorage can be taken in the southern part of Kalmarsund and off the northern side of Oland.

Pilots can be obtained at Kalmar and Bergkvara. Small harbors get pilotage support from these stations.

Kalmar and Oskarshamn are the principal ports on the mainland. On Oland, Borgholm and Degerhamn are main ports.

NAVIGATION

3-2 From a position about 12 miles south-southeastward of Torhamnsudde (56°04'N., 15°51'E.), a course of 059° for 21 miles leads to a position about 8 miles south-southeastward of Olands Sodra Udde. Thence a course of 025° for 93 miles leads to a position about 10 miles east-southeastward of Knolls Grund and 21 miles east-northeastward of Olands Norra Udde (57°22'N., 17°06'E.).

These tracks pass over a least depth of 20 fathoms at their closest coastal approach, about 6 miles off the southern end of Oland.

Detailed navigational information pertaining to port approaches is included in the principal description of the ports.

WINDS—WEATHER

3-3 See section 2-3, southerly seabreezes prevail in Kalmarsund during the summer. Fog develops chiefly in the spring and fall. Although precipitation is slight, northeasterly and southeasterly winds can cause considerable precipitation.

CURRENTS—WATER LEVEL

3-4 See section 2-4. The current in Kalmarsund is caused by the wind and usually sets northward or southward, attaining a rate of 3 to 4 knots with winds of gale force. The current off the northern and southern ends of Oland sets easterly or westerly. The water level in Kalmarsund is raised by northeasterly gales and lowered by southwesterly gales.

ICE

3-5 See section 2-5. Ice forms in Kalmarsund during January and February. Main channels are kept open by icebreakers. Minor ports are closed from January to April.

PART A. KALMARSUND

KALMARSUND—GENERAL

3A-1 Kalmarsund is a navigable passage, about 85 miles long, between Oland and the mainland, westward. It is about 12 miles

wide at the southern and northern entrances. Islets and shoals near the middle of Kalmarsund contract the navigable passage to 1 3/4 miles. The main channel and adjacent dangers are marked by buoys. Vessels with a draft of 25 feet can transit Kalmarsund.

DEPTHS—DANGERS

3A-2 Numerous patches lie near the fairway through Kalmarsund. Only those dangers close to the main fairway are described. Buoys marking dangers may be removed during the ice season.

Yttre Stengrund lighted whistle buoy is moored on the 10-fathom curve, in the entrance of Kalmarsund about 10 miles from Torhamnsudde and Olands Sodra Udde (56° 12'N., 16°24'E.). Shoal patches lie about 3 miles westward of the buoy.

UTGRUNDEN, patches with a least depth of 1 1/2 fathoms, lies about 11 miles north-northeastward of Yttre Stengrund and 4 miles westward of Oland. A buoy is moored on the western edge of Utgrunden, about 1 1/4 miles eastward of the fairway. Several 6-fathom patches lie close to the fairway.

UTGRUNDET, shoals with a least depth of 2 fathoms, lies about 3 1/2 miles northward of Utgrunden. A buoy marks the edge of the shoals about 1 mile eastward of the fairway.

MITTGRUNDEN, a 3 1/2-fathom shoal marked by buoys, is a northerly extension of Utgrundet.

HAGBYGRUND, shoals with a least depth of 1 fathom, lies about 10 1/2 miles northward of Utgrunden. A buoy marks the southern end of the shoals about 1 mile westward of the fairway.

The main fairway, about 9 fathoms deep off Hagbygrund, turns north-northeastward and leads through constricted waters about 7 1/2 fathoms deep. The coastal reefs extending offshore converge on the fairway, now about 1 mile wide. Buoys mark the edge of the reefs.

TRADGARDSGRUND, with a least depth of 2 fathoms, lies on the eastern edge of the fairway about 2 1/2 miles southward of Kalmar. A lighted buoy marks Tradgardsgrund and a buoy is moored at the side of the fairway close westward. A wreck lies about one-half mile southward of the lighted buoy.

Kalmarsund, for about 4 miles north-northeastward of Tradgardsgrund, is almost completely blocked by rocks and rocky shoals.

KALMARS DJUPRANNA, a channel about 260 feet wide and dredged to a least depth of 26 feet, leads through the foul area. Lights and lighted buoys mark the ends and sides of the channel. Branch channels lead to harbors eastward and westward of the main channel.

From KRONGRUNDET, a 1-fathom shoal at the northeastern end of the dredged channel, the main fairway leads northeastward and northward between shoal patches marked by buoys. The fairway depth is about 5 fathoms.

At SKAGGENAS (56°46'N., 16°28'E.), an island about 5 miles north-northeastward of Krongrundet, the navigable sound is about 2 miles wide. The northern end of Sillasen, shoals of 1 3/4 fathoms, lies southeastward of Skaggenas and close westward of the fairway. A light marks the edge of the shoals.

Between Sillasen and Damman, a light marking shoals awash about 18 1/2 miles north-northeastward of Sillasen, the sound gradually becomes wider as it approaches the northern entrance. The fairway leads in depths of 5 to 6 fathoms to a position about 1 1/4 miles eastward of Damman. Numerous patches of 1 1/2 to 3 fathoms, marked by buoys, lie close to the fairway. Slottsbredan are 3 1/4-fathom shoals lying in the center of the sound about 8 miles south-southeastward of Damman. A light marks the western edge of the shoals. A wreck lies in the fairway about 4 1/4 miles southward of Slottsbredan.

BLA JUNGFRUN (57°15'N., 16°48'E.), is a precipitous, conical-shaped island about 12 1/2 miles north-northeastward of Damman. The navigable part of the sound is about 10 miles wide in the vicinity of the island, with depths of 7 1/2 to 21 fathoms.

There are depths of 10 to 23 fathoms in the fairway between Bla Jungfrun and the entrance of Kalmarsund, about 10 miles northward.

OFF-LYING DANGERS

3A-3 OLANDS SODRA GRUND, with a least depth of 5 3/4 fathoms, lies about 12 miles southeastward of the southern extremity of Oland. A light is shown, fog signals are

sounded, and a radiobeacon transmits from the lighthouse (56°04'N., 16°41'E.)

Norra Midsjobanken, about 9 miles long, with a least depth of 5 fathoms at the northern end, lies about 33 miles eastward of the southern extremity of Oland (56°12'N., 16°24'E.). Sodra Midsjobanken, with depths of 7 1/2 to 10 fathoms, lies about 43 to 53 miles southeastward of the same extremity. A dangerous wreck lies in 55°32.2'N., 17°18'E., northward of an 8 1/4-fathom patch.

KNOLLS GRUND, a rocky 5-fathom shoal about 16 miles northeastward of the northern extremity of Oland (57°22'N., 17°06'E.), lies at the northern end of a bank with depths of 6 1/2 to 20 fathoms.

In fog, it is recommended that northbound vessels pass eastward and southbound vessels pass westward of Olands Sodra Grund.

AIDS TO NAVIGATION

3A-4 A light is shown from Utgrunden (sec. 3A-2). A fog signal is sounded from the lighthouse.

Skansgrundet Light is shown from the southeastern end of Kalmar Djupranna (sec. 3A-2). Krongrundet Light is shown from the northeastern end. Fog signals are sounded from the light stations. Lights are shown from the eastern side of the channel. Beacons, serving as marks for the pilots, stand on islets outside the channel.

A light is shown and a fog signal is sounded from Sillasen and Slottsbredan (sec. 3A-2). Masknaggen Light 56°44'N., 16°28'E., marks a 1 1/4-fathom shoal about 3 miles northeastward of Krongrundet. A fog signal is sounded from the light station and from Damman (sec. 3A-2).

Lights are shown from Bla Jungfrun (sec. 3A-2).

CURRENTS

3A-5 See section 3-4. Strong winds may cause difficult current conditions in the approaches and main channel off Kalmar. The current set should be observed on entering Kalmarsund. Powerful cross-channel currents are encountered off Kalmar and southward of the southern entrance of the main channel.

WINDS-WEATHER

3A-6 See section 3-3. Strong winds and storms are rare in Kalmarsund during the

late spring and summer. Strong northerly and northeasterly winds raise heavy swells on the shoals and rough, choppy seas in the northern part of Kalmarsund.

ICE

3A-7 See section 3-5.

PILOTS

3A-8 See section 3-1. Pilotage is compulsory in Kalmarsund. Krakelund, at the northwestern entrance of the sound, Kalmar, Bergkvara, and Aspo (sec. 2B-34), are pilot stations where pilots can be obtained at any time for Kalmarsund. Other stations within the sound are described with related features.

Ships entering the southern entrance of Kalmarsund can obtain pilots from Bergkvara (sec. 3B-2) during the day and on request. A change of pilots is effected close westward of Tradgardsgrund, northward of Sillasen, and finally clear of Furo Island (57°17'N., 16°38'E.). The reverse procedure is effective for ships bound southward through the sound.

ANCHORAGES

3A-9 Anchorage can be taken in the southern part of Kalmarsund, from the entrance to about 3 miles southward of Kalmar. Vessels can ride out southerly and southwesterly gales, in suitable depths, anchored on good holding ground of sand and clay.

In northern Kalmarsund, choppy seas and poor holding ground make anchoring untenable in stormy weather.

Tenable anchorage can be taken in 6 fathoms, clay, westward of Krongrundet and about 1 mile northward of Sillasen in 8 to 11 fathoms, clay. Anchorage can also be taken in 4 to 9 fathoms, clay, on the flat northward of the main channel off Kalmar.

Anchorage is prohibited about one-half mile eastward of Skansgrund, in an area bounded northward by the easterly approach channel to Kalmar; also between Skaggenas and Oland.

The quarantine anchorage, in 9 to 13 fathoms, clay, lies between Krongrundet and an islet about 1 mile southward.

DIRECTIONS

3A-10 See section 3-2. From a position about 12 miles south-southeastward of Tor-

hamsudde, steer 017° for about 30 miles to Utgrunden Lighthouse, passing 1 mile eastward of Yttre Stengrund lighted whistle buoy.

From about one-half mile westward of Utgrunden Lighthouse, with Skansgrundet Lighthouse ahead, steer 015° for about 15 miles to Tradgardsgrund lighted buoy at the southerly approach to Kalmars Djupranna. At all times on approaching or departing Utgrunden, keep in the white sector of that light.

From Tradgardsgrund Buoy steer north-northeastward for Skansgrundet Lighthouse, thence through the buoyed channel. With Krongrundet astern, steer northeastward and north-northeastward through the fairway marked by buoys, passing eastward and westward, respectively, of Sillasen and Slottbredan light structures.

With Slottbredan light structure astern, steer 026° for about 8 miles, passing eastward of Damman light structure (sec. 3A-2). Thence steer a course of 018°, passing eastward of Bla Jungfrun and about 6 1/2 miles westward of the northern extremity of Oland.

ANCHORAGES

3A-11 KALMARSUND.—See section 3A-9.

PART B. TORHAMNSUDDE TO KALMAR

3B-1 TORHAMNSUDDE is described in section 2B-37.

COAST—GENERAL

3B-2 The coast between Torhamnsudde and Kalmar, about 39 miles north-northeastward, is low and partly wooded. The coastal shoal, with depths of less than 5 fathoms and closely contained by the 5-fathom curve, extends about 4 miles offshore in places. Rocks, reefs and patches of less than 1 fathom lie on the shoal. At night, this coast should not be approached in depths less than 10 fathoms.

Landmarks consist of church steeples standing near the few minor harbors. Kalmar is the only major port on this coast.

Anchorage, with local knowledge, can be taken off some minor harbors.

COASTAL FEATURES—LANDMARKS

3B-3 Between Torhamnsudde and Bergkvara (56°23'N., 16°06'E.), about 21 miles distant, the coast is very irregular, of uniform height and densely wooded. At Orranas, a village about 8 miles from Torhamnsudde, are dwellings and farms on a ridge. A huge windmill stands on a hill about 2 miles northeastward of Orranas.

SANDHAMN, a sheltered fishing harbor at the head of a bight about 1 1/4 miles northward of Torhamnsudde (sec. 2B-37), is formed by a breakwater. A fairway leading to an outer anchorage will accommodate vessels with a draft of 14 3/4 feet to the harbor. There is a 330-foot pier in the harbor with 13 feet alongside. A reef, awash, lies about 1 mile off the harbor, close northward of the fairway. Buoys mark the sides of the reef.

Range lights lead through the fairway into the harbor.

Anchorage can be taken in 4 1/2- to 5 1/2-fathoms, mud and clay, between the reef and breakwater. Southeasterly gales raise a heavy swell.

Pilots can be obtained from Aspo (sec. 2B-35), or Bergkvara.

Supplies of water and provisions are available. There is a marine railway with a lifting capacity of 60 tons.

SVANHALLA, a fishing harbor about 3 miles from Torhamnsudde, is formed by a breakwater. A channel about 6 1/2 feet deep leads southward of a reef, awash, and to a pier with 6 1/2 feet alongside. Vessels with a draft of 6 feet can enter the harbor.

Range lights lead through the fairway into the harbor.

The coast between Svanhalla and Kristianopel, about 10 miles north-northeastward, is fronted by rocks, islets marked by beacons, patches of less than 2 fathoms and above- and below-water reefs. The outer extremity of these dangers are marked by buoys.

KRISTIANOPEL (56°15'N., 16°03'E.), a narrow harbor close eastward of a spit, is 11 1/2 feet deep. A buoyed channel leads from about 2 miles offshore to a pier with 10 1/2 feet alongside. Vessels with a draft of 9 1/4 feet can berth at the pier. Rocky 1 1/4-fathom

shoals, marked by a buoy, lie about 1 mile offshore and close northward of the channel.

Range lights lead through the fairway into the harbor. A church steeple in town is conspicuous.

Anchorage can be taken in 2 3/4 fathoms, sand, about 1 mile off the harbor, between the two outer channel buoys. Southeasterly gales raise a heavy swell.

Pilots can be obtained from Bergkvara.

Supplies of provisions, water and fuel oil are available.

BERGKVARA (56°23'N., 16°06'E.) the best natural harbor in the southern part of Kalmar sund, is located on the coast about 7 1/2 miles north-northeastward of Kristianopel. Three fairways, marked by buoys, lead into the harbor, 17 feet deep, sand and mud. A 330-foot quay, with 17 feet alongside, is at the southern side of the harbor. At the northwestern side are quays 1,150 feet long with 8 to 17 feet alongside. Vessels with a draft of 15 3/4 feet are accommodated alongside the deep berths. A fishing and boat harbor, close northward of the main harbor, is formed by breakwaters. Fairways lead between breakwater heads to a pier with 8 feet alongside.

The southern, southeastern, and northeastern fairways leading between shoals of 1 1/4 and 1 1/2 fathoms, marked by buoys, will accommodate vessels with a draft of 13, 15 3/4, and 10 feet, respectively. The narrow, northeastern fairway is used only with local knowledge.

Range lights, shown in the fishing harbor, lead through the southeastern approach fairway to a position about 1 mile southeastward of the harbor. Range lights, shown about one-half mile southward of the harbor, lead from the southeastern fairway to the entrance fairway. Range lights lead through the entrance fairway to the main and fishing harbors. A cairn on an islet eastward of the harbor, aligned with a church about 3 1/2 miles northward of town, leads through the southern approach fairway to the buoyed channel.

Pilots are stationed in Bergkvara. They can be obtained during the day, and upon request, about 2 miles southeastward of the harbor, in the vicinity of the southeastern approach fairway.

Supplies of provisions, water and fuel oils are available.

3B-4 BETWEEN BERGKVARA AND KALMAR, about 18 miles north-northeastward, the low, wooded coast is fronted by islets, rocks, and shoals extending about 2 1/2 miles offshore. Buoys mark the outer edges of the shoals.

GARPEN (56°23'N., 16°08'E.), an islet about 1 1/4 miles eastward of Bergkvara fishing harbor, is encircled by reefs and shoals marked by buoys close southward and eastward. A submarine cable is laid between the fishing harbor, Garpen, and Utgrunden light structure (sec. 3A-4). A light is shown from Garpen.

HOSSMOGRUND, detached patches of less than 1 fathom, marked by buoys, extend about 3 1/2 miles south-southeastward of Kalmar and within 1 mile westward of the main fairway through Kalmar sund.

EKENAS, a harbor about 8 miles from Bergkvara, is about 1 1/2 feet deep, mud and clay. Vessels with a draft of 9 3/4 feet can enter the harbor through a buoyed channel between outer shoals. A pier in the harbor has depths of 8 3/4 to 9 1/2 feet alongside. Vessels with a draft of 8 3/4 feet can berth at the pier.

Range beacons, close northward of the harbor, lead through the approach channel. The entrance channel, about 400 yards offshore, leads between buoys to the pier.

Anchorage can be taken in 1 3/4 to 2 1/4 fathoms, good holding ground, close north-eastward of the front range beacon.

Pilots can be obtained from Bergkvara or Kalmar.

Supplies of provisions, water and fuel oil are available.

KALMAR (56°40'N., 16°22'E.)

3B-5 Kalmar, the principal harbor in Kalmar sund, is formed by a mole and breakwater. Much of the city stands on Quvarnholm, an island connected by several bridges to the mainland.

ICE.—Icebreakers keep the harbor and approaches open, even during severe winters.

DEPTHS—DANGERS.—From Kalmar Djupranna (sec. 3A-2), an entrance channel about 200 feet wide and 24 1/2 feet deep leads to Kalmar Harbor. Shoals of less than 1 3/4 fathoms, marked by buoys, lie on both sides of the entrance channel.

A channel, marked by buoys, leads from Djupranna through a fairway, at least 26 feet deep, to an oil dock on the eastern side of the mole. Vessels with a draft of 25 feet are accommodated. A 1 1/4-fathom patch, marked by a lighted buoy close south-eastward, lies about 100 yards off the oil dock.

Grimskar (56°39'N., 16°21'E.), an islet marked by a beacon, lies on the western side of Djupranna, opposite Skansgrundet light structure. A buoy marks a sewer out-fall about one-half mile southward of the beacon. Shoals with depths of less than 1 fathom lie between Grimskar and Djupranna. Mines are laid east-northeastward from Grimskar.

Prastor, a low islet marked by a beacon, lies on the eastern side of Djupranna, about 300 yards northward of Skansgrundet. Grytan, a 1 1/2-fathom patch, lies about 350 yards north-northeastward of the beacon. A 3 1/4-fathom patch lies in the channel between Prastor and Grytan.

Ombojningen light, with a radar reflector, marks the eastern side of Djupranna about one-fourth mile from Kalmar breakwater. Huvudet and Osvalisgrund lights, shown from the western side of Djupranna, mark shoals extending northeastward from Kalmar.

Submarine cables are laid between Kalmar and Oland. Beacons on shore about 1 mile westward of Skansgrundet light structure mark the cable landing. Other cables from Kalmar are laid to the lights marking Djupranna.

LANDMARKS.—Prominent landmarks include a cathedral with four spires, a tall chimney, standpipe, and Kalmar Castle with four towers standing on an island close southwestward of Kalmar.

HARBOR.—The harbor, divided into old and new parts, is 15 to 21 1/2 feet deep. The old harbor, southwestward of the northern breakwater, contains the Customs Basin and Olands Basin, about 16 1/2 and 15 feet deep, respectively. In the basin approaches there is 16 1/2 to 21 1/2 feet.

The sheltered new harbor lies between Tjarhovet, the southeastern mole, and Finngrundet, a mole extending northeastward from the center of the harbor. The new harbor is 18 1/2 to 21 1/2 feet deep.

There is over 13,000 feet of quays throughout the harbor. The entrance channel, leading between the breakwater head and Tjarhovet, is 21 1/2 feet deep. Vessels with a draft of about 21 feet can enter the harbor.

AIDS TO NAVIGATION.—Lights in range, 285°, shown from the head of the northern breakwater and at the Customs Basin, lead through the entrance fairway. Lights in range, 271°, shown from a quay close southward of the Customs Basin, lead into the harbor from the entrance close southward of the breakwater and close northward of a 1 1/4-fathom patch.

Lights in range, 304°, shown from an islet about one-half mile northward of the harbor entrance, lead through the fairway to a shipyard on the islet.

PILOTS.—See section 3A-8. Pilots can be obtained at any time from the pilot station located on the northeastern end of Tjarhovet. Vessels board pilots close southward of Tradgardsgrund (56°38'N., 16°22'E.), or in the vicinity of Krongrundet, Masknaggen, and Sillasen. Notice, at least 5 hours prior to E.T.A., is required.

ANCHORAGE.—See section 3A-9. Anchorage can be taken in 4 to 6 1/2 fathoms, clay, southeastward of Grimskar, westward of the alignment of Grimskar beacon and Kalmar standpipe.

DIRECTIONS.—See section 3A-10. Departing Kalmars Djupranna abeam of Prastor beacon, steer northeastward between the buoys marking dangers on the sides of the fairway. Pass eastward and northward of Ombojningen light, thence enter the harbor on the approach and entrance ranges.

Small vessels steer a course through Djupranna, departing the main channel on the alignment of the approach or entrance ranges.

3B-6 KALMAR, with a population of about 32,000, is a commercial center and the site of a flourishing glass works. It is a first port of entry.

Exports include lumber, fertilizers, paper, flour, foods, and oil products. Imports include petroleum, coal, salt, grains, and metals.

BERTHS.—Finngrundet, in the center of the harbor, has about 2,300 feet of quays with 16 1/2 to 21 1/2 feet alongside. The entire length of Tjarhovet, the wide southeastern

mole, has quays with 18 1/2 to 21 1/2 feet alongside. Barlastholmen, the inner part of Finngrundet, has 14 1/2 to 18 feet alongside. The Oil Dock, 265-feet long, has 26 feet alongside. Several ferry slips in the old harbor have 16 1/2 feet alongside. There are numerous cranes with a capacity of 5-to 8-tons and two 4-ton floating cranes.

SUPPLIES.—Provisions, water, fuel and diesel oils are available at the oil quay. There are oil barges. Tugs and lighters are available.

REPAIRS.—General repairs are made at the shipyard where there is a quay with 13 1/4 feet alongside. Vessels and tugs of 1,100 d.w.t. are built on the largest marine railway. A floating drydock, with a 3,000 d.w.t. capability, is available. The largest crane can lift 20 tons.

COMMUNICATIONS.—The quays are all connected with the Swedish railroad system. Ferries ply frequently between the harbor and Oland. There is an airport at Kalmar. Shipping is carried on with Baltic ports.

Deratting.—See section 1-4.

Medical.—There is a hospital and quarantine station in Kalmar.

PART C. KALMAR TO KRAKELUND

3C-1 Kalmar is described in sections 3B-5 and 3B-6.

COAST—GENERAL

3C-2 The coast between Kalmar and Krakelund (57°27'N., 16°43'E.), about 50 miles north-northeastward, is low and wooded. The irregular coastline is indented by numerous bights and inlets, some having minor harbors at their heads. The entire coast is fronted by rocks, reefs, and shoals extending in part to the main fairway through Kalmarsund. Several islands lie off the coast. Fairways, marked by buoys, lead between dangers to various harbors. Oskarshamn is the principal port on this coast.

Local Magnetic Disturbances exist between Oskarshamn and the northern entrance of Kalmarsund.

COASTAL FEATURES—LANDMARKS

3C-3 Between Kalmar and Svarto (57°05'N., 16°35'E.), about 26 miles distant, the

coastal shoal abounds in rocks, with detached patches of less than 3 fathoms extending to Damman (sec. 3A-2), about 3 1/2 miles southeastward of Svarto.

SKAGGENAS, a low, densely wooded, prominent island, lies close offshore about 7 miles from Kalmar. Foul ground surrounds Skaggenas.

REVSUDDEN is a sheltered fishing harbor on a spit projecting from the southeastern side of Skaggenas. The fairway leads north-westward to the harbor between patches marked by buoys with radar reflectors, to a pier 425 feet long with a depth of 8 feet alongside.

Range lights lead through the fairway. Lights and beacons mark the northern and southern landings, respectively, of submarine cables from Oland to Revsudden.

Anchorage is prohibited in the cable area.

Supplies of provisions and water are available.

DRAG is a harbor at the head of a bight between the western end of Skaggenas and the coast. A fairway, marked by buoys, leads in 11 feet to a jetty with 5 feet alongside. Anchorage can be taken in 4 to 5 fathoms, mud, about 2 1/2 miles southward of Drag.

PATAHOLM is a harbor at the head of a foul bight about 8 miles northward of Skaggenas. A fairway, with a least depth of 14 feet, leads northwestward from Kalmarsund between numerous rocky patches marked by buoys. The harbor, about 12 feet deep, is entered through the fairway leading to a pier with 11 1/2 feet alongside. The harbor entrance is subject to silting.

Anchorage can be taken in 5 to 6 1/2 fathoms, clay, close westward of Paslan (56°54'N., 16°31'E.), an islet marked by a beacon about 2 1/2 miles southeastward of Pataholm harbor. Anchorage can be taken in 4 fathoms about one-half mile eastward of the harbor.

Pilots can be obtained at Masknaggen (sec. 3A-4), and in the vicinity of Vallo (57°06'N., 16°39'E.), if at least 5-hour prior notice of E.T.A. is given.

Supplies of provisions, water, and fuel oil are available.

TILLINGENABBEN is a harbor about 14 1/2 feet deep on an inlet 3 miles northward of Pataholm. From about 1 mile southwestward

hamsudde, steer 017° for about 30 miles to Utgrunden Lighthouse, passing 1 mile eastward of Yttre Stengrund lighted whistle buoy.

From about one-half mile westward of Utgrunden Lighthouse, with Skansgrundet Lighthouse ahead, steer 015° for about 15 miles to Tradgardsgrund lighted buoy at the southerly approach to Kalmars Djupranna. At all times on approaching or departing Utgrunden, keep in the white sector of that light.

From Tradgardsgrund Buoy steer north-northeastward for Skansgrundet Lighthouse, thence through the buoyed channel. With Krongrundet astern, steer northeastward and north-northeastward through the fairway marked by buoys, passing eastward and westward, respectively, of Sillasen and Slottbredan light structures.

With Slottbredan light structure astern, steer 026° for about 8 miles, passing eastward of Damman light structure (sec. 3A-2). Thence steer a course of 018°, passing eastward of Bla Jungfrun and about 6 1/2 miles westward of the northern extremity of Oland.

ANCHORAGES

3A-11 KALMARSUND.—See section 3A-9.

PART B. TORHAMNSUDDE TO KALMAR

3B-1 TORHAMNSUDDE is described in section 2B-37.

COAST—GENERAL

3B-2 The coast between Torhamnsudde and Kalmar, about 39 miles north-northeastward, is low and partly wooded. The coastal shoal, with depths of less than 5 fathoms and closely contained by the 5-fathom curve, extends about 4 miles offshore in places. Rocks, reefs and patches of less than 1 fathom lie on the shoal. At night, this coast should not be approached in depths less than 10 fathoms.

Landmarks consist of church steeples standing near the few minor harbors. Kalmar is the only major port on this coast.

Anchorage, with local knowledge, can be taken off some minor harbors.

COASTAL FEATURES—LANDMARKS

3B-3 Between Torhamnsudde and Bergkvara (56°23'N., 16°06'E.), about 21 miles distant, the coast is very irregular, of uniform height and densely wooded. At Orranas, a village about 8 miles from Torhamnsudde, are dwellings and farms on a ridge. A huge windmill stands on a hill about 2 miles northeastward of Orranas.

SANDHAMN, a sheltered fishing harbor at the head of a bight about 1 1/4 miles northward of Torhamnsudde (sec. 2B-37), is formed by a breakwater. A fairway leading to an outer anchorage will accommodate vessels with a draft of 14 3/4 feet to the harbor. There is a 330-foot pier in the harbor with 13 feet alongside. A reef, awash, lies about 1 mile off the harbor, close northward of the fairway. Buoys mark the sides of the reef.

Range lights lead through the fairway into the harbor.

Anchorage can be taken in 4 1/2- to 5 1/2-fathoms, mud and clay, between the reef and breakwater. Southeasterly gales raise a heavy swell.

Pilots can be obtained from Aspo (sec. 2B-35), or Bergkvara.

Supplies of water and provisions are available. There is a marine railway with a lifting capacity of 60 tons.

SVANHALLA, a fishing harbor about 3 miles from Torhamnsudde, is formed by a breakwater. A channel about 6 1/2 feet deep leads southward of a reef, awash, and to a pier with 6 1/2 feet alongside. Vessels with a draft of 6 feet can enter the harbor.

Range lights lead through the fairway into the harbor.

The coast between Svanhalla and Kristianopel, about 10 miles north-northeastward, is fronted by rocks, islets marked by beacons, patches of less than 2 fathoms and above- and below-water reefs. The outer extremity of these dangers are marked by buoys.

KRISTIANOPEL (56°15'N., 16°03'E.), a narrow harbor close eastward of a spit, is 11 1/2 feet deep. A buoyed channel leads from about 2 miles offshore to a pier with 10 1/2 feet alongside. Vessels with a draft of 9 1/4 feet can berth at the pier. Rocky 1 1/4-fathom

shoals, marked by a buoy, lie about 1 mile offshore and close northward of the channel.

Range lights lead through the fairway into the harbor. A church steeple in town is conspicuous.

Anchorage can be taken in 2 3/4 fathoms, sand, about 1 mile off the harbor, between the two outer channel buoys. Southeasterly gales raise a heavy swell.

Pilots can be obtained from Bergkvara.

Supplies of provisions, water and fuel oil are available.

BERGKVARA (56°23'N., 16°06'E.) the best natural harbor in the southern part of Kalmarsund, is located on the coast about 7 1/2 miles north-northeastward of Kristianopel. Three fairways, marked by buoys, lead into the harbor, 17 feet deep, sand and mud. A 330-foot quay, with 17 feet alongside, is at the southern side of the harbor. At the northwestern side are quays 1,150 feet long with 8 to 17 feet alongside. Vessels with a draft of 15 3/4 feet are accommodated alongside the deep berths. A fishing and boat harbor, close northward of the main harbor, is formed by breakwaters. Fairways lead between breakwater heads to a pier with 8 feet alongside.

The southern, southeastern, and northeastern fairways leading between shoals of 1 1/4 and 1 1/2 fathoms, marked by buoys, will accommodate vessels with a draft of 13, 15 3/4, and 10 feet, respectively. The narrow, northeastern fairway is used only with local knowledge.

Range lights, shown in the fishing harbor, lead through the southeastern approach fairway to a position about 1 mile southeastward of the harbor. Range lights, shown about one-half mile southward of the harbor, lead from the southeastern fairway to the entrance fairway. Range lights lead through the entrance fairway to the main and fishing harbors. A cairn on an islet eastward of the harbor, aligned with a church about 3 1/2 miles northward of town, leads through the southern approach fairway to the buoyed channel.

Pilots are stationed in Bergkvara. They can be obtained during the day, and upon request, about 2 miles southeastward of the harbor, in the vicinity of the southeastern approach fairway.

Supplies of provisions, water and fuel oils are available.

3B-4 BETWEEN BERGKVARA AND KALMAR, about 18 miles north-northeastward, the low, wooded coast is fronted by islets, rocks, and shoals extending about 2 1/2 miles offshore. Buoys mark the outer edges of the shoals.

GARPEN (56°23'N., 16°08'E.), an islet about 1 1/4 miles eastward of Bergkvara fishing harbor, is encircled by reefs and shoals marked by buoys close southward and eastward. A submarine cable is laid between the fishing harbor, Garpen, and Utgrunden light structure (sec. 3A-4). A light is shown from Garpen.

HOSSMOGRUND, detached patches of less than 1 fathom, marked by buoys, extend about 3 1/2 miles south-southeastward of Kalmar and within 1 mile westward of the main fairway through Kalmarsund.

EKENAS, a harbor about 8 miles from Bergkvara, is about 1 1/2 feet deep, mud and clay. Vessels with a draft of 9 3/4 feet can enter the harbor through a buoyed channel between outer shoals. A pier in the harbor has depths of 8 3/4 to 9 1/2 feet alongside. Vessels with a draft of 8 3/4 feet can berth at the pier.

Range beacons, close northward of the harbor, lead through the approach channel. The entrance channel, about 400 yards offshore, leads between buoys to the pier.

Anchorage can be taken in 1 3/4 to 2 1/4 fathoms, good holding ground, close north-eastward of the front range beacon.

Pilots can be obtained from Bergkvara or Kalmar.

Supplies of provisions, water and fuel oil are available.

KALMAR (56°40'N., 16°22'E.)

3B-5 Kalmar, the principal harbor in Kalmarsund, is formed by a mole and breakwater. Much of the city stands on Quvarnholm, an island connected by several bridges to the mainland.

ICE.—Icebreakers keep the harbor and approaches open, even during severe winters.

DEPTHS—DANGERS.—From Kalmar Djupranna (sec. 3A-2), an entrance channel about 200 feet wide and 24 1/2 feet deep leads to Kalmar Harbor. Shoals of less than 1 3/4 fathoms, marked by buoys, lie on both sides of the entrance channel.

A channel, marked by buoys, leads from Djupranna through a fairway, at least 26 feet deep, to an oil dock on the eastern side of the mole. Vessels with a draft of 25 feet are accommodated. A 1 1/4-fathom patch, marked by a lighted buoy close south-eastward, lies about 100 yards off the oil dock.

Grimskar (56°39'N., 16°21'E.), an islet marked by a beacon, lies on the western side of Djupranna, opposite Skansgrundet light structure. A buoy marks a sewer out-fall about one-half mile southward of the beacon. Shoals with depths of less than 1 fathom lie between Grimskar and Djupranna. Mines are laid east-northeastward from Grimskar.

Prastor, a low islet marked by a beacon, lies on the eastern side of Djupranna, about 300 yards northward of Skansgrundet. Grytan, a 1 1/2-fathom patch, lies about 350 yards north-northeastward of the beacon. A 3 1/4-fathom patch lies in the channel between Prastor and Grytan.

Ombojningen light, with a radar reflector, marks the eastern side of Djupranna about one-fourth mile from Kalmar breakwater. Huvudet and Osvallsgrund lights, shown from the western side of Djupranna, mark shoals extending northeastward from Kalmar.

Submarine cables are laid between Kalmar and Oland. Beacons on shore about 1 mile westward of Skansgrundet light structure mark the cable landing. Other cables from Kalmar are laid to the lights marking Djupranna.

LANDMARKS.—Prominent landmarks include a cathedral with four spires, a tall chimney, standpipe, and Kalmar Castle with four towers standing on an island close southwestward of Kalmar.

HARBOR.—The harbor, divided into old and new parts, is 15 to 21 1/2 feet deep. The old harbor, southwestward of the northern breakwater, contains the Customs Basin and Olands Basin, about 16 1/2 and 15 feet deep, respectively. In the basin approaches there is 16 1/2 to 21 1/2 feet.

The sheltered new harbor lies between Tjarhovet, the southeastern mole, and Finngrundet, a mole extending northeastward from the center of the harbor. The new harbor is 18 1/2 to 21 1/2 feet deep.

There is over 13,000 feet of quays throughout the harbor. The entrance channel, leading between the breakwater head and Tjarhovet, is 21 1/2 feet deep. Vessels with a draft of about 21 feet can enter the harbor.

AIDS TO NAVIGATION.—Lights in range, 285°, shown from the head of the northern breakwater and at the Customs Basin, lead through the entrance fairway. Lights in range, 271°, shown from a quay close southward of the Customs Basin, lead into the harbor from the entrance close southward of the breakwater and close northward of a 1 1/4-fathom patch.

Lights in range, 304°, shown from an islet about one-half mile northward of the harbor entrance, lead through the fairway to a shipyard on the islet.

PILOTS.—See section 3A-8. Pilots can be obtained at any time from the pilot station located on the northeastern end of Tjarhovet. Vessels board pilots close southward of Tradgardsgrund (56°38'N., 16°22'E.), or in the vicinity of Krongrundet, Masknaggen, and Sillasen. Notice, at least 5 hours prior to E.T.A., is required.

ANCHORAGE.—See section 3A-9. Anchorage can be taken in 4 to 6 1/2 fathoms, clay, southeastward of Grimskar, westward of the alignment of Grimskar beacon and Kalmar standpipe.

DIRECTIONS.—See section 3A-10. Departing Kalmars Djupranna abeam of Prastor beacon, steer northeastward between the buoys marking dangers on the sides of the fairway. Pass eastward and northward of Ombojningen light, thence enter the harbor on the approach and entrance ranges.

Small vessels steer a course through Djupranna, departing the main channel on the alignment of the approach or entrance ranges.

3B-6 KALMAR, with a population of about 32,000, is a commercial center and the site of a flourishing glass works. It is a first port of entry.

Exports include lumber, fertilizers, paper, flour, foods, and oil products. Imports include petroleum, coal, salt, grains, and metals.

BERTHS.—Finngrundet, in the center of the harbor, has about 2,300 feet of quays with 16 1/2 to 21 1/2 feet alongside. The entire length of Tjarhovet, the wide southeastern

mole, has quays with 18 1/2 to 21 1/2 feet alongside. Barlastholmen, the inner part of Finngrundet, has 14 1/2 to 18 feet alongside. The Oil Dock, 265-feet long, has 26 feet alongside. Several ferry slips in the old harbor have 16 1/2 feet alongside. There are numerous cranes with a capacity of 5-to 8-tons and two 4-ton floating cranes.

SUPPLIES.—Provisions, water, fuel and diesel oils are available at the oil quay. There are oil barges. Tugs and lighters are available.

REPAIRS.—General repairs are made at the shipyard where there is a quay with 13 1/4 feet alongside. Vessels and tugs of 1,100 d.w.t. are built on the largest marine railway. A floating drydock, with a 3,000 d.w.t. capability, is available. The largest crane can lift 20 tons.

COMMUNICATIONS.—The quays are all connected with the Swedish railroad system. Ferries ply frequently between the harbor and Oland. There is an airport at Kalmar. Shipping is carried on with Baltic ports.

Deratting.—See section 1-4.

Medical.—There is a hospital and quarantine station in Kalmar.

PART C. KALMAR TO KRAKELUND

3C-1 Kalmar is described in sections 3B-5 and 3B-6.

COAST—GENERAL

3C-2 The coast between Kalmar and Krakelund (57°27'N., 16°43'E.), about 50 miles north-northeastward, is low and wooded. The irregular coastline is indented by numerous bights and inlets, some having minor harbors at their heads. The entire coast is fronted by rocks, reefs, and shoals extending in part to the main fairway through Kalmarsund. Several islands lie off the coast. Fairways, marked by buoys, lead between dangers to various harbors. Oskarshamn is the principal port on this coast.

Local Magnetic Disturbances exist between Oskarshamn and the northern entrance of Kalmarsund.

COASTAL FEATURES—LANDMARKS

3C-3 Between Kalmar and Svarto (57°05' N., 16°35'E.), about 26 miles distant, the

coastal shoal abounds in rocks, with detached patches of less than 3 fathoms extending to Damman (sec. 3A-2), about 3 1/2 miles southeastward of Svarto.

SKAGGENAS, a low, densely wooded, prominent island, lies close offshore about 7 miles from Kalmar. Foul ground surrounds Skaggenas.

REVSUDDEN is a sheltered fishing harbor on a spit projecting from the southeastern side of Skaggenas. The fairway leads north-westward to the harbor between patches marked by buoys with radar reflectors, to a pier 425 feet long with a depth of 8 feet alongside.

Range lights lead through the fairway. Lights and beacons mark the northern and southern landings, respectively, of submarine cables from Oland to Revsudden.

Anchorage is prohibited in the cable area. Supplies of provisions and water are available.

DRAG is a harbor at the head of a bight between the western end of Skaggenas and the coast. A fairway, marked by buoys, leads in 11 feet to a jetty with 5 feet alongside. Anchorage can be taken in 4 to 5 fathoms, mud, about 2 1/2 miles southward of Drag.

PATAHOLM is a harbor at the head of a foul bight about 8 miles northward of Skaggenas. A fairway, with a least depth of 14 feet, leads northwestward from Kalmarsund between numerous rocky patches marked by buoys. The harbor, about 12 feet deep, is entered through the fairway leading to a pier with 11 1/2 feet alongside. The harbor entrance is subject to silting.

Anchorage can be taken in 5 to 6 1/2 fathoms, clay, close westward of Paslan (56° 54'N., 16°31'E.), an islet marked by a beacon about 2 1/2 miles southeastward of Pataholm harbor. Anchorage can be taken in 4 fathoms about one-half mile eastward of the harbor.

Pilots can be obtained at Masknaggen (sec. 3A-4), and in the vicinity of Vallo (57°06'N., 16°39'E.), if at least 5-hour prior notice of E.T.A. is given.

Supplies of provisions, water, and fuel oil are available.

TILLINGENABBEn is a harbor about 14 1/2 feet deep on an inlet 3 miles northward of Pataholm. From about 1 mile southwestward

of Slottsbredan (sec. 3A-2), a fairway 16 1/2 feet deep leads to Matge Islet, about 1 mile southeastward of the harbor. A channel, 12 feet deep, leads into the harbor. Range beacons on the islet and ashore lead through the fairways. A pier in the harbor, with about 12 feet alongside, will accommodate vessels with a draft of 10 feet. The fairways are subject to silting.

Anchorage can be taken in 4 1/4 to 7 fathoms, clay, off Vaderon (56°57'N., 16°30'E.), an island about 2 miles southeastward of Tillingenabben. Anchorage can be taken in 3 to 4 fathoms, mud and clay, close westward of Matge Islet.

Pilots can be obtained from Masknaggen, or Vallo on prior notice of arrival.

TIMMERNABBEN, a harbor less than 1 mile northward of Tillingenabben, has a pier with 6 1/4 feet alongside. The fairway leading to the pier, westward of Matge Islet, is about 9 feet deep. Buoys mark dangers at the sides of the fairway.

Anchorage can be taken in about 2 fathoms off the pier.

3C-4 MONSTERAS (57°02'N., 16°27'E.), is a harbor at the head of an inlet about 4 miles northward of Timmernabben and 23 miles from Kalmar. Stora Okno is the eastern extremity of a peninsula extending about 4 miles southeastward from Monsteras. Svartoren is an islet about one-half mile northeastward of Stora Okno. Landmarks are Monsteras Church and Kavershall, a high hill standing about 2 1/2 miles northeastward of Monsteras.

The sheltered harbor is about 11 1/2 feet deep. There is about 2,000 feet of quays in the harbor, all having rail connections. An approach fairway from Kalmarsund will accommodate vessels with a draft of 17 1/4 feet between detached patches, marked by buoys, to the Inner Roads. An entrance channel, marked by buoys and lights, in which vessels with a draft of 11 1/2 feet can enter the harbor and berth alongside the quays, leads from the Inner Roads.

Range lights on Stora Okno lead through the approach fairway to close southward of Svartoren. Range lights in town lead in the entrance channel to the harbor.

Anchorage can be taken in 5 fathoms, mud and clay, northwestward of Stora Okno. Anchorage can be taken in 3 to 5 fathoms,

mud and clay, in the southern part of the Inner Roads about 2 1/2 miles southeastward of Monsteras.

Pilots can be obtained from Masknaggen (sec. 3A-4), and in the vicinity of Vallo (sec. 3C-5), if prior notice of arrival is transmitted to Oskarshamn pilot station (sec. 3C-6).

Supplies of provisions and fuel oils are available. Water is piped to the quays. A tug can be obtained.

There is a hospital in town.

SVARTO (57°05'N., 16°35'E.), a coastal outcropping about 5 miles northeastward of Monsteras, is fronted by shoals of less than 2 fathoms, marked by buoys, extending eastward to Damman (sec. 3A-2). Gaso, an islet about 1 1/2 miles southeastward of Svarto, is marked by a stone beacon.

3C-5 BETWEEN SVARTO AND KRAKELAND (57°27'N., 16°43'E.), about 24 miles distant, the irregular coast forms a broad bight, heavily indented and fronted by many rocks, islets and shoals. Buoys and lights mark many of these dangers.

VALLO and Runno are islands lying close offshore and within 5 miles northward of Svarto. The southeastern part of Vallo is densely wooded, prominent, and marked by a beacon. Sando Orskar islet, about 1 1/2 miles northwestward of Vallo, is marked by a prominent beacon. Buoys mark the edge of foul ground extending eastward from the islands. Submarine cables are laid between the islands and mainland.

STORA JATTERSON (57°06'N., 16°34'E.), a loading place on an islet close offshore, has a wharf with 23 1/2 feet alongside. Vessels with a draft of 22 feet are accommodated in the principal approach fairway and alongside the wharf. The fairway, marked by buoys, leads southwestward between Runno and Sando Orskar islet, thence southward, passing between the mainland and Vallo. Secondary fairways, marked by buoys, lead westward and northwestward of Damman (sec. 3A-2). Local knowledge is required.

Range lights lead through the three reaches of the principal fairway leading to Stora Jatterson.

Anchorage can be taken in 5 1/2 to 6 1/2 fathoms, mud and clay, about one-third mile northward of the wharf.

Pilots are obtained southward of Furo (sec. 3C-6), and Masknaggen (sec. 3A-4), at any time. On prior notice to Oskarshamn pilots are boarded northward and southward of Vallo (sec. 3C-5).

PASKALLAVIK is a sheltered harbor on the coast about 7 miles northward of Monstera and westward of Runno Island. The harbor is 16 1/2 feet deep. A 330-foot quay and pier have 16 1/2 feet and 13 to 15 feet alongside, respectively. The approach fairways are tortuous, leading between numerous rocks and detached patches marked by buoys. The main fairway from eastward of Runno, leading between that island and the coast, will accommodate vessels with a draft of 16 feet into the harbor and alongside the wharf. Northwestward of Runno, a buoyed secondary fairway accommodating vessels with a draft of 11 feet, leads southwestward to the harbor.

Anchorage can be taken in 5 to 7 fathoms, mud and clay, about 1 mile northeastward of the harbor.

Pilots can be obtained at Masknaggen, southward of Furo, and in the vicinity of Vallo on prior notice to Oskarshamn.

Supplies of provisions, fuel oil, and water are available. Berths have railroad connections.

OSKARSHAMN (57°16'N., 16°27'E.)

3C-6 Oskarshamn, the principal harbor in the northern part of Kalmarsund, is located at the head of a bight about 6 miles northward of Paskallavik.

ICE.—The harbor and approaches are seldom closed by ice. An icebreaker will keep the channel open if necessary.

DEPTHS—DANGERS.—Between the harbor and Furo Island, about 6 miles eastward, lie numerous shoals and detached patches.

FURO (57°17'N., 16°38'E.), about one-half mile northward of the main approach channel, is a small bare island surrounded by reefs on which the sea breaks. Patches of less than 3 fathoms, marked by buoys, lie between the reefs and approach fairways. A light marks Finnrevet Reef, lying off the southeastern side of Furo. A submarine cable is laid between Furo and the mainland, north-westward.

Flatbottnarna, detached patches of less than 1 fathom, partly awash, lie about 3 1/2 miles eastward of the harbor and close southward of the main approach channel.

Buoys mark the northern limits of the patches.

Stotbotten, a 2 3/4-fathom patch marked by a buoy, and an unmarked 3-fathom patch, lie close to the fairway northward of Flatbottnarna.

Several 1 1/2 and 2 1/2 fathom patches, marked by buoys, lie close to the approach and entrance fairways.

The main approach channel leading west-northwestward from Kalmarsund will accommodate vessels with a draft of 25 feet. The western channel, 18 feet deep, leading southward of Furo and Stotbotten, will accommodate vessels with a draft of 17 feet.

A southwesterly approach channel leads from northward of Furo between buoys to a junction with the main channel northward of Stotbotten. Vessels with a draft of 15 feet enter the channel. From westward of Stotbotten, a channel 36 feet deep, marked by buoys, leads westward to an oil harbor. A branch of this channel leads southwestward to the harbor.

A southeasterly approach channel, in which vessels with a draft of 11 1/2 feet can enter the harbor, leads between patches marked by buoys.

The entrance channel, at least 25 feet deep, leads between patches, marked by buoys, into the harbor.

LANDMARKS.—Furo Island, the town church, a standpipe, and tall chimneys close southeastward of town, are prominent.

HARBOR.—The sheltered harbor is 16 to 33 feet deep, mud and clay. Quays line the shores of the harbor. Narrow channels lead between numerous patches lying close to the fairways. These dangers and the sides of the entrance channel are marked by buoys.

Grimskallen, the northeastern side of the harbor, is the site of an oil harbor about 40 feet deep.

Ovadersudden, the southeastern side of the harbor, is the site of a Copper Works. Northward and eastward of Ovadersudden lie Orgrundet and Klubb islets, both near the fairway. Klubb is marked by a prominent beacon (57°16'N., 16°29'E.).

A shipyard, drydock and slips are located at the southern side of the harbor.

The navigable head of the harbor is about 14 to 26 1/4 feet deep around the quays.

A MINEFIELD (sec. 1-109), in which anchorage is prohibited, extends from the

northern shore opposite the shipyard, to close eastward of Klubb islet and across the entrance channel to Grimskallen.

AIDS TO NAVIGATION.—Lights in range, 271°, shown at Grimskallen, lead through the eastern approach fairway to the entrance channel. Lights in range, 321°, shown from Grimskallen, lead through the southeastern approach fairway. The front range light is common to both ranges. Lights in range, 289°, are shown about 1 1/2 miles north-eastward of Grimskallen.

A light shown from Ovadersudden leads through the entrance fairway to the Copper Works.

Badholmen Light is shown from a point at the head of the harbor. The white sector of the light leads through the entrance fairway. Beacons on Grimskallen and Klubb serve as daymarks.

PILOTS.—Pilots are stationed at Arnemar, about 1 mile southeastward of Oskarshamn, the pilot center for the area. Ships board pilots at any time southward of Furo at the approach channel, eastward of the outer shoals off Oskarshamn, at Masknaggen, and on arrangement in the vicinity of Vallo.

3C-7 ANCHORAGE.—Anchorage can be taken in 10 to 11 fathoms, mud and clay, eastward of Grimskallen. Anchorage can also be taken in 7 1/2 to 9 fathoms, mud and clay, close northward of Klubb islet.

DIRECTIONS.—From about one-half mile southward of Finnrevet light, steer 271°, keeping the approach range lights on Grimskallen ahead and passing southward of Stotbotten. When about one-half mile from Grimskallen, change course to 236° and steer for Ovadersudden light. From close aboard the light, change course to 283 1/2° with Badholmen light structure ahead.

From about 1 mile southward of Furo, vessels with a draft of 25 feet steer 289° on the Tillingeo Range alignment for 2 1/2 miles, passing between the fairway buoys close northward of Stotbotten. Thence steer 245° on the Arnemar Range for the approach channel, marked by buoys, and the 271° range alignment on Grimskallen.

From southeastward, steer 321° on the Grimskallen Range alignment, passing between buoys marking the fairway until the entrance channel leading to Ovadersudden is entered. Change course to about 236° and proceed to the quays.

3C-8 OSKARSHAMN, with a population of about 13,000, is a market town and commercial center. It is a first port of entry.

Exports include lumber, pulpwood, paper, ore, chemical products and fabricated houses. Imports include cement, iron, fuels, sulphur, flour, and canned goods.

BERTHS.—There are over 6,000 feet of quays in the harbor and shipyard. The oil harbor quay, 135-feet long, has about 39 1/3-feet alongside. North Quay is about 1,500 feet long with 15 3/4 to 25 feet alongside. South Quay is about 1,200 feet long with 14 3/4 to 19 1/2 feet alongside. Bradholms Quay, at the head of the harbor, is about 750 feet long with 15 3/4 feet alongside. The Copper Works Quay is 820 feet long with 26 1/4 feet alongside. Oskarshamn Shipyard has about 1,600 feet of quays with 10 to 18 feet alongside. There are two 100-foot oil jetties with about 10 to 28 feet alongside. Several cranes on the various quays have lifting capacities of 3 to 10 tons.

SUPPLIES.—Water is available on the quays and by water boat. Bunker oils can be obtained at Bradholms Quay and the Oil Harbor. Stores and provisions can be procured. A tug of 1,720 h.p. is available.

REPAIRS.—Major repairs to hull and machinery can be made at the shipyard where the largest of the marine railways is 350 feet long with a lifting capacity of 7,000 d.w.t. A drydock 430 feet long, 57 feet wide, with a depth over the sill of 17 1/2 feet, has a capability of 9,000 d.w.t. There are ship-repair ways for ships of 20,000 d.w.t. There is a 50-ton sheerlegs, also various cranes of 5 to 20 tons capacity.

COMMUNICATIONS.—The quays are connected with the general railroad system. Modern car ferries ply between the harbor and ports of Gotland and Oland. There are shipping services with various Swedish ports.

DERATTING.—See section 1-4.

MEDICAL.—There is a hospital in town.

COASTAL FEATURES—LANDMARKS (Continued)

3C-9 The coast between Oskarshamn and Krakelund, about 14 miles northeastward, is of uniform height and wooded. Islands and islets lying close offshore are low and difficult to distinguish. The coastal shoal extending about 3 miles offshore, has patches of less than 2 1/2 fathoms marked by buoys.

A detached 3-fathom shoal, marked by buoys, lies about 5 miles northeastward of Finnrevet Light.

STORA SALTVIK (57°18'N., 16°30'E.), about 2 miles from Oskarshamn, has a sheltered inner harbor with a pier having a depth of 8 feet alongside. A fairway leading from close northward of Stotbotten (sec. 3C-6), between patches marked by buoys, will accommodate vessels with a draft of 12 1/2 feet to the outer harbor. Anchorage can be taken in 1 1/2 to 4 1/2 fathoms in the outer harbor. Pilots can be obtained near Furo.

VIRBO, a fishing harbor about 4 1/2 miles from Oskarshamn, has a pier with a depth of 8 feet alongside. A fairway, used with local knowledge, will accommodate vessels with a draft of 11 1/2 feet to the outer harbor. A light is shown from a rock southeastward of the harbor. Sheltered anchorage can be taken in about 3 fathoms, clay, in the outer harbor. Pilotage is arranged through Oskarshamn. Pilots are boarded southward of Furo.

FIGEHOLM (57°22'N., 16°33'E.), is a commercial harbor at the head of a bight about 7 miles from Oskarshamn. The bight and approaches are cluttered with shoals and islets. The harbor, 13 to 17 feet deep, has two piers with 6 to 16 feet alongside. The principal pier, with 14 to 16 feet alongside, is reached through a fairway accommodating vessels with a draft of 15 3/4 feet. The narrow fairway, marked by buoys and beacons, is entered about 2 miles northeastward of Furo. Local knowledge is required.

Anchorage, sheltered, can be taken in 4 1/4 to 6 1/2 fathoms, mud, close northward of an islet lying about 1 1/4 miles southeastward of the harbor.

Pilots are boarded eastward of Bredgrund (57°25'N., 16°47'E.) and southward of Furo at any time on prior notice to Oskarshamn.

Supplies of water and provisions are available.

KRAKELUND (57°27'N., 16°43'E.), at the eastern extremity of Upplango, an island lying close offshore about 7 miles northeastward of Figeholm, is marked by a beacon. A light is shown close northward of the beacon. Stubbskar Beacon stands on an islet close southward. Bredgrund, patches of 2 1/4 fathoms, marked by buoys, lie about 2 miles southeastward of Krakelund.

Pilots from Krakelund can be obtained at any time eastward of Bredgrund for passage through Kalmarsund (sec. 3A-1).

Anchorage can be taken in about 8 fathoms, sand and clay, close eastward of Krakelund. Vessels with a draft of about 18 feet can proceed in a channel to the anchorage.

PART D. OLAND

3D-1 OLANDS SODRA UDDE (56°12'N., 16°24'E.), is a low, bare promontory located at the southern extremity of Oland. A light is shown, a fog signal is sounded, and a radio-beacon transmits from the lighthouse marking the promontory.

OLAND—GENERAL

3D-2 The island of Oland, forming the eastern side of Kalmarsund, is about 2 to 8 1/2 miles wide and 77 miles long north-northeastward and south-southwestward. Engaged extensively in agriculture and the breeding of livestock, the island is a popular summer resort. Limestone and alum are quarried. Cement manufacturing is an important industry. Trade is conducted principally with the Swedish mainland. Busses connect the various parts of the island.

Oland is generally low and partly wooded. Alvaret Ridge, extending nearly the length of the island, is mostly barren. Lighthouses mark the extremities of Oland. Reefs and shoals, contained within the 10-fathom curve, extend about 3 miles offshore in places.

DEPTHS—DANGERS

3D-3 OLANDSREV, on which the sea breaks, extends about 2 1/2 miles southward and eastward from Olands Sodra Udde (sec. 3D-1). Wrecks lie sunk on the eastern edge of the reef. Shoals of 3 to 5 fathoms, the outer edges marked by buoys, extend about 3 miles southward and eastward from Olandsrev. The western side of the reef and shoal are steep-to, with the 10-fathom curve lying close eastward of the shoal.

Rocks, and shoals of less than 5 fathoms, lie up to 2 1/2 miles off the western coast of Oland as far north as Borgholm (sec.

3D-11). The coast farther northward is free of dangers.

OLANDS NORRA GRUND, with a least depth of 2 1/4 fathoms, lies about 7 miles northward of Olands Norra Udde (sec. 3D-13). Buoys, including a lighted whistle buoy with a radar reflector, mark the northern side of the shoal.

Shoals of 3 1/2 to 5 fathoms extend about 5 miles eastward and northeastward from Olands Norra Udde. The 20-fathom curve, from close eastward of the shoals, trends southward about 2 to 4 miles offshore.

Rocks, and shoals of less than 5 fathoms, marked by buoys, extend about 2 miles off the eastern coast of Oland. A detached 11-fathom bank lies about 8 miles south-eastward of Hogby (sec. 3D-14).

Off-lying dangers are described in section 3A-3.

NAVIGATION

3D-4 See sections 3-2 and 3A-10.

CURRENTS

3D-5 See section 3-4.

COASTAL FEATURES—LANDMARKS

3D-6 BETWEEN OLANDS SODRA UDDE AND MORBYLANGA (56°32'N., 16°23'E.), a point about 20 miles northward, the barren, unindented coast is backed by Alvaret Ridge. Several windmills stand atop the ridge. Numerous houses and churches are seen close to the shore. An extensive forest stands about 1 mile northward of Olands Sodra Udde.

GRONHOGEN, a fishing harbor about 4 1/4 miles from Olands Sodra Udde, is formed by two breakwaters. The harbor, 10 1/2 to 11 3/4 feet deep, mud over clay, is fronted on the eastern side by a foul area. An extension of the western breakwater forms a quay with 11 3/4 feet alongside. A pier nearby has the same depth. Vessels with a draft of 10 feet can enter the harbor through a dredged channel and berth alongside.

Range lights lead through the fairway, into the harbor. A light is shown from the head of the northern breakwater.

Pilots can be obtained from Bergkvara (sec. 3B-3).

Supplies of provisions, water, and fuel oil are available.

DEGERHAMN (56°21'N., 16°25'E.)

3D-7 Degerhamn, an industrial harbor, is formed by two breakwaters with an entrance about 180 feet wide. The sheltered harbor, about 9 1/2 miles from Olands Sodra Udde, is a center for the shipping of large quantities of cement.

ICE.—Ice, set into the harbor by westerly winds, may hinder shipping.

DEPTHS—DANGERS.—A dredged channel 16 1/2 feet deep, subject to silting, leads northeastward from Kalmarsund between breakwater heads into the harbor. Vessels with a draft of 15 feet can enter the harbor and berth alongside the quays.

Buoys moored about 3 miles northwestward and southwestward of the harbor mark the outer limits of the coastal shoal in the approaches to ports. In the harbor buoys mark the outer edge of shoals lying inside the western breakwater and off the cement works.

LANDMARKS.—A church close northeastward and a high chimney about 1 mile southward of the harbor are prominent. In the harbor area are prominent chimneys and a silo.

HARBOR.—The dredged part of the harbor is 10 to 16 feet deep, rock and clay. The western part of the harbor is about 4 1/2 to 9 feet deep. The eastern harbor is equally deep except at the quays.

AIDS TO NAVIGATION.—Lights in range, 078 1/2°, shown from masts about 1 mile southward of the harbor lead through the approach channel. A lighted buoy is moored on the range line outside the harbor. Lights in range, 018°, shown from masts standing on the cement quay, lead through the entrance channel between the breakwaters. A light is shown from the head of the southern breakwater. The head of the western breakwater is illuminated by floodlight.

PILOTS.—Pilots can be obtained from Bergkvara (sec. 3B-3), and Kalmar (sec. 3B-5).

ANCHORAGE.—Anchorage, open to westerly winds, can be taken in 5 fathoms,

clay, about three-fourths mile southwestward of the approach range beacons.

DIRECTIONS.—See section 3A-10. From 1 mile eastward of Yttre Stengrund Buoy steer 031° for about 13 miles until the approach range, 078 1/2°, is aligned. Steer through the approach channel to the breakwater entrance. Steer 018° on the entrance range through the buoyed channel into the harbor.

3D-8 DEGERHAMN, with about 1,500 inhabitants, is the site of a large Cement Works. It is a customs port.

Exports include lime, cement, grain, and stone from the quarries. Imports include coal, timber, and oil.

BERTHS.—The principal cement quay, over 425 feet long, has 15 3/4 feet alongside. Other quays and a pier have 9 to 13 3/4 feet alongside. Several 3-ton cranes are available.

SUPPLIES.—Provisions and fuel oils are available. A limited supply of water can be obtained.

REPAIRS.—Minor repairs can be made.

COASTAL FEATURES—LANDMARKS (Continued)

3D-9 MORBYLANGA, a harbor built around a point about 11 miles northward of Degerhamn, is formed by two breakwater. Ice seldom closes this sheltered harbor, but southerly and southwesterly storms over Kalmarsund cause swells to enter port.

Two channels, marked by buoys, lead from Kalmarsund to the harbor entrance. Vessels with a draft of 16 1/2 and 13 feet can enter the harbor by northern and southern channels, respectively, and berth alongside most quays. The harbor, subject to silting, is about 13 3/4 feet deep, mud. A buoy, moored about 1 1/4 miles northwestward of the entrance between breakwaters, marks the northeastern side of the northern channel. The southern quay, and part of the western quay, are 8 1/4 to 11 3/4 feet deep alongside.

Range lights in town lead through the fairway of the northern approach channel into the harbor. A light is shown from the head of the northern breakwater.

Anchorage can be taken in 4 to 5 fathoms, sand and clay, about three-fourths mile southwestward of the northern breakwater head.

Pilots can be obtained from Kalmar and Bergkvara.

Supplies of provisions, water, and fuel oils are available.

3D-10 BETWEEN MORBYLANGA AND BORGHOLM, a harbor about 23 miles distant, the coast turns north-northeastward. There are no prominent landmarks along this regular coastline. The coastal shoal on which lie numerous rocks, extends to the main fairway through Kalmarsund. About 4 miles from Morbylanga a stone groin extends 1 mile offshore. Small craft, with local knowledge, can find shelter in the lee of the groin and several islets nearby.

FARJESTADEN, opposite Kalmar, and about 8 miles from Morbylanga, is a harbor formed by two breakwaters. Ferries ply between the harbor and Kalmar. The main approach channel leads between numerous dangers marked by buoys, and is kept open by an icebreaker if necessary. This 180-foot wide main channel leads east-southeastward from Kalmar's Djupranna (sec. 3A-2), between breakwater heads, to the head of the harbor. Vessels with a draft of 13 feet can enter the harbor and berth alongside the quays. A branch channel, marked by buoys with radar reflectors, leaves the main channel about 1 1/2 miles from the harbor entrance and turns north-northeastward, rejoining the main channel off the breakwaters.

The harbor, about 6 1/2 to 14 3/4 feet deep, has northern and southern quays with 13 to 14 3/4 feet alongside. There are several ferry slips.

Lights and buoys mark the approach channel to Farjestaden, Kalmar Tredingsgrund and Norra Midsundgrundet Lights, with radar reflectors, are shown from the southern and northern sides of the channel, respectively. Range lights, shown near the head of the harbor, lead through the approach fairway. Postgrundet Light, with a radar reflector,

is shown about 1 mile off Farjestaden and close northward of the channel. Range beacons standing northward and southward of the harbor lead through the reaches of the branch channel.

Pilots can be obtained from Kalmar.

Supplies of provisions, fuel oil, and water are available.

ISPEUDE (56°45'N., 16°31'E.), is a point on the coast about 6 miles from Farjestaden. A light is shown from the point.

STORA ROR, about 1 mile from Ispeudde, is a sheltered harbor formed by two breakwaters. The entrance and navigable part of the harbor is about 11 1/2 feet deep. The eastern and southern parts of the harbor are shallow. An entrance channel, about 11 3/4 feet deep, leads from Kalmarsund between the breakwaters into the harbor. There is about 11 1/2 feet alongside the quays. Vessels with a draft of 11 feet can enter the harbor and berth alongside. Ferries connect with Skaggenas (sec. 3C-3) during the summer.

Range lights, shown from beacons at the head of the harbor, lead through the entrance fairway. Submarine cables, the landings marked by lighted and unlighted beacons, are laid between Stora Ror and Revsudden (sec. 3C-3).

Pilots can be obtained from Kalmar and Sillasen, the latter less than 1-mile northward of Stora Ror.

Supplies of provisions, fuel oil, and water are available.

BORGHOLM (56°53'N., 16°39'E.)

3D-11 Borgholm is a sheltered harbor located about 8 1/2 miles from Stora Ror.

Ice may close the harbor to small vessels during January and February.

DEPTHS-DANGERS.—The approach channel from Kalmarsund, about 18 feet deep, leads east-southeastward between shoals marked by buoys, to close southward of Hamngrund, a reef on which the sea breaks. A buoy marks the southern end of the reef. Krakan, reefs with depths of less than 1 fathom, lies about 250 yards southwestward of Hamngrund. The entrance channel, 16 1/2 to 18 feet deep, leads eastward to the northern harbor. Vessels with a draft of 15 3/4 feet can enter the harbor. A branch of the

entrance channel, 13 3/4 feet deep, leads between buoys to the southeastern harbor. Fringing reefs lie on both sides of this channel. A secondary approach channel, about 11 feet deep but seldom used, leads from northwestward between reefs and shoals marked by buoys, and joins the entrance channel eastward of Hamngrund.

LANDMARKS.—Borgholm Castle, in ruins, is a very conspicuous landmark standing on a steep cliff about one-half mile southward of the harbor. Solliden Royal Castle, one-half mile southwestward of the ruins, is prominent from northwestern Kalmarsund. A conspicuous signal mast stands close southward of the castle.

HARBOR.—The harbor, considered the best on Oland, is sheltered by a mole built southwestward from the northern part of the harbor, and by reefs extending offshore southward of the harbor. The navigable harbor is 6 1/2 to 16 1/2 feet deep. The eastern and southern sides are foul. The northern side of the harbor is fronted by about 800 feet of quays. The southeastern part of the harbor, about 13 3/4 feet deep, has a quay and pier. Quays line the face of the mole.

AIDS TO NAVIGATION.—Lights in range, 111°, are shown from the head of the southeastern harbor. Lights in range, 081°, are shown from the head of the northern harbor. A light is shown from Krakudden (56°53'N., 16°38'E.) about one-half mile southwestward of the harbor.

PILOTS.—Pilots can be obtained from Kalmar and Sillasen (sec. 3D-10) at any time.

ANCHORAGE.—Anchorage can be taken, in favorable weather, within 1 mile of the harbor in 3 to 6 fathoms, clear of the shoals.

DIRECTIONS.—See section 3A-10. From a position about 2 1/2 miles southward of Slottsbredan light structure, steer 111° through the main approach channel, keeping the range lights aligned. When the entrance range bears 081°, change course on this alignment and proceed through the fairway into the northern harbor. If proceeding to the southeastern harbor, change course when southward of the molehead and enter the buoyed southeastern channel.

3D-12 BORGHOLM, with about 2,400 inhabitants, is the largest community on Oland. It is a port of entry.

Exports include limestone, building materials, and lumber. Imports include fuels and commodities.

BERTHS.—Quays in the northern harbor have 14 3/4 to 16 1/2 feet alongside. The pier and quays in the southeastern part of the harbor have 10 to 13 3/4 feet alongside. There is a crane of 3 tons capacity.

SUPPLIES.—Provisions, fuel oil, and water are available.

COMMUNICATIONS.—There are bus connections with all parts of Oland. A ferry service to Kalmar is maintained and shipping is conducted with the Swedish mainland.

MEDICAL.—There is a hospital in town.

COASTAL FEATURES—LANDMARKS (Continued)

3D-13 The coast between Bornholm and Olands Norra Udde (57°22'N., 17°06'E.), about 34 miles north-northeastward, is steep and light-colored. The northern part of the coast is wooded. Alvaret (sec. 3D-6), backing the coast, shows several groves of trees. The regular coast line is indented for about 2 miles eastward of Bornholm by a bight containing numerous rocks and shoals. The coastal shoal, extending about 4 miles northward of Bornholm, has patches of 1 and 2 fathoms, marked by buoys. The 10-fathom curve lies about one-half mile off most of this coast.

SANDVIK (57°04'N., 16°52'E.) is a partly sheltered harbor, formed by two curved moles, about 15 miles from Borgholm. A grist mill is prominent in the village. An approach channel, at least 13 feet deep, leads eastward from Kalmarsund between the moleheads. There are quays with 13 feet alongside on the inner side of the northern mole. Shoals fill the southern harbor. The northern harbor is 10 to 13 feet deep. Vessels with a draft of 11 1/2 feet can enter the harbor and berth alongside the northern mole. The channel and entrance is subject to silting.

Range lights lead through the approach channel. Local residents act as pilots. Limited quantities of supplies are available.

HORNSUDDE (57°12'N., 16°55'E.), is a blunt cape about 8 miles from Sandvik. A light is shown from the cape. Heavy swells are seen on banks about 5 and 7 miles northward of Hornsudde during northerly and northeasterly gales.

BYXELKROK is a fishing harbor formed by a breakwater about 8 1/2 miles from Hornsudde. The harbor, at the northern end of a bight, is approached through a fairway leading between shoals, marked by buoys. Quays in the harbor have 8 to 12 feet alongside. Vessels with a draft of 10 1/2 feet can enter the harbor and berth alongside the quays.

Range beacons lead through the approach fairway to the harbor entrance. The white sector of a light, shown from the head of the breakwater, leads through the fairway. A light is shown from Tokenasudde, at the southern end of the bight.

Supplies, in limited quantities, are available.

OLANDS NORRA UDDE (57°22'N., 17°06'E.), is a peninsula at the northern extremity of Oland, about 3 1/2 miles from Byxelkrok. Olands Norra Udde Light is shown from an islet close eastward of the peninsula. An auxiliary light is shown, a fog signal is sounded, and a radiobeacon transmits from the light tower on the islet. Obstruction lights are shown from a masthead about 1 1/2 miles southwestward of the light tower.

GRANKULLAVIKEN, a bay extending about 2 miles southward from Olands Norra Udde, is formed by that peninsula and the northeastern end of Oland. Numerous rocks, and shoals of less than 1 fathom, lie in the bay. Rock, reefs, and islets partially block the entrance. Breakwaters, partly demolished, lie about three-fourths mile southeastward of Olands Norra Udde. A lighted buoy, moored close seaward of the breakwaters, marks the approach fairway leading between the breakwaters.

NABELLUND, a village with a sawmill and lumber storage, is located on the western shore of the bay. A pier, about 700 feet long with 14 to 16 1/2 feet alongside, fronts the village. The entrance channel, marked by buoys with radar reflectors, leads in 17 feet from the breakwaters to the

pier. Vessels with a draft of 14 3/4 feet can enter the bay and berth alongside the pier. Strong northwesterly and northeasterly winds make the bay untenable.

Range lights, shown near the sawmill, lead through the entrance channel to the pier.

Anchorage can be taken off the pierhead in 4 to 5 fathoms, clay. Pilotage is performed by local residents.

3D-14 BETWEEN OLANDS NORRA UDDE AND KAPELLUDDEN (56°49'N., 16°51'E.), a point about 35 miles south-southwestward, the eastern coast of Oland is low and irregular, with no prominent landmarks. The coastal shoal, extending 2 to 2 1/2 miles offshore in places, is marked by buoys close seaward.

ANGJARNSUDDEN (57°18'N., 17°09'E.), is the northeastern point of Oland. Shoals of 3 1/2 to 5 fathoms extend about 6 miles northeastward from the point. Bodabukten, a broad bight southwestward of Angjarnsudden, is shoal.

BODA, a fishing harbor at the southern entrance of the bight, is formed by two breakwaters. The harbor, open to northeasterly winds, is 10 to 13 feet deep in the southeastern part. Shoals fill other parts. An approach fairway, about 13 feet deep, leads from seaward between the breakwaters to quays, 10 to 13 feet deep, along the inner side of the southern breakwater. Vessels with a draft of 10 3/4 feet can enter the harbor and berth alongside the quays.

Range lights lead through the approach fairway. Floodlights illuminate the breakwater heads. Local knowledge is necessary to enter the harbor.

HOGBY (57°09'N., 17°03'E.), is a finger peninsula about 6 1/4 miles southward of Boda. A light is shown from Hogby.

KAREHOLM, a low, bare islet lies close offshore, about 12 1/2 miles from Hogby. A beacon and boathouse on the islet are conspicuous. Shoals, marked by buoys close seaward, extend about 2 1/2 miles offshore and 4 1/2 miles northeastward from Kareholm.

KAREHAMN, a sheltered fishing harbor close westward of Kareholm, is formed by two breakwaters. An approach fairway leads westward between shoals, marked by buoys,

to the harbor entrance. An entrance channel, marked by buoys with reflectors, leads to quays with 10 feet alongside on the inner side of the western breakwater. Vessels with a draft of 9 feet can enter the harbor and berth alongside the quays.

Range lights ashore lead through the approach fairway.

Anchorage can be taken southward and southwestward of Kareholm in 2 1/4 fathoms, clay and sand. The anchorage, open to easterly winds, is safe for vessels with a draft of 11 feet, although the sea breaks over the outer shoals.

Anchorage can be taken in 1 1/2 fathoms, ample swinging room, westward of Kareholm.

KAPELLUDDEN (56°49'N., 16°51'E.), is a point on the coast about 8 1/2 miles southward of Karehamn. A light is shown from the point.

3D-15 BETWEEN KAPELLUDDEN AND OLANDS SODRA UDDE (56°12'N., 16°24'E.), about 40 miles south-southwestward, the low coast is without prominent features or landmarks.

Gunfiring exercises are conducted in an area having its northern limit extending about 7 miles eastward of a coastal position 5 1/2 miles from Kapelludden. The area parallels the coast for 16 miles.

BLASINGE, a fishing harbor about 13 miles from Kappelludden, is formed by a breakwater. The harbor, sheltered from southerly winds, is 7 feet deep. An approach fairway, about 7 feet deep, leads northwestward to the head of the breakwater. Vessels with a draft of 6 feet can enter the harbor and berth at quays having 6 1/2 feet alongside. A stone beacon marks the head of the breakwater.

SEGERSTAD (56°22'N., 16°34'E.), is a blunt point about 16 miles south-southwestward of Blasinge. A light is shown from the point.

GRASGARDSHAMN, a fishing harbor about 3 1/2 miles from Segerstad, is formed by two breakwaters. An approach channel, marked by buoys, leads northwestward to the entrance between the breakwaters. The entrance and entrance channel, marked by buoys, is 5 1/2 feet deep, subject to silting. Vessels with a draft of 4 feet can enter the harbor.

Range lights in the harbor lead through the approach fairway. A fog signal is sounded from the front range light.

Anchorage can be taken in 2 fathoms, sand and stones, about one-half mile southward of the harbor and one-fourth mile eastward of the local church. The anchorage, exposed to southerly winds, is sheltered eastward by a long, narrow reef.

Rocks, awash, lie about 2 1/2 miles southward of Gragardshamn. A buoy is moored about 1 mile eastward of the rocks. A wreck, marked close westward by a buoy with green flag, lies about 1 1/4 miles southeastward of the rocks.

Olands Sodra Udde is described in section 3D-1.

ANCHORAGES

3D-16 DEGERHAMN.—See section 3D-7.

BORGHOLM.—See section 3D-11.

OLANDS NORRA UDDE.—Anchorage can be taken in fine weather and during a southerly breeze, about 1 mile northeastward of Olands Norra Udde light tower in 10 fathoms, clay. Small vessels anchor in 3 1/2 fathoms, stones and sand, northward of the light tower.

BODABUKTEN.—Anchorage, sheltered from offshore winds, can be taken in 6 1/2 fathoms, sand, about 2 1/4 miles off the western shore of the bay.

VARHOLMSUDDE.—Anchorage can be taken in about 10 fathoms, sand and clay, 2 1/2 miles eastward of Varholmsudde, a point about 1 mile southward of Kareholm.

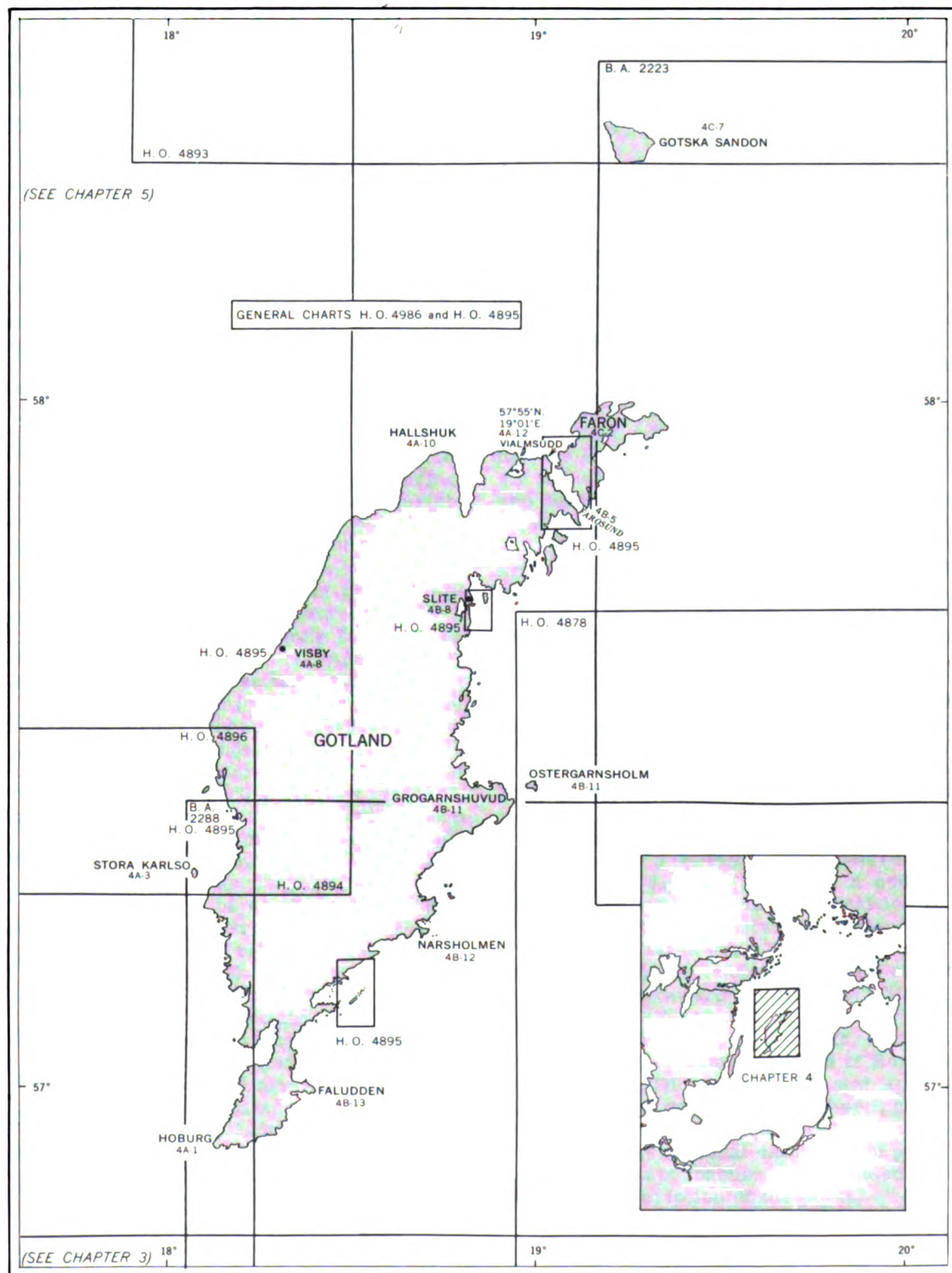


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
 Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 4—GRAPHIC INDEX

CHAPTER 4

GOTLAND, FARON, AND GOTSKA SANDON

- Part A. Gotland, West Coast
- Part B. Gotland, East Coast
- Part C. Faron and Gotska Sandon

Plan.—This chapter describes the islands of Gotland, Faron, and Gotska Sandon with their Approaches, including the off-lying Kopparstenarna Shoal. The sequence of description is from south to north on the west coast and from north to south on the east coast.

GENERAL REMARKS

4-1 Gotland, an insular part of Sweden and the largest island in the Baltic, lies about 45 miles off the Swedish coast. The island, of limestone formation, is about 67 miles long. The inhabitants of Gotland are engaged principally in agriculture and cattle raising. A considerable industry is carried on in beet-sugar refining, cement, lumbering, fishing, and quarrying. Numerous tourists visit Gotland.

The major part of the coast of Gotland is wooded, rising steeply from the sea to form a plateau about 85 to 140 feet high. A few detached hills rise above the plateau. A peninsula, about 9 miles long forming the southern end of Gotland, is joined to the island by an isthmus less than 2 miles wide.

The coast of Gotland is indented by numerous shallow bights. There are several salient points marked by lights. Rocks, reefs, and shoals front the greater part of Gotland and Faron, extending about 3 1/2 miles offshore, except along the northern and northwestern coast which are free of dangers. The 20-fathom curve lies about 3 1/2 to 5 miles offshore in most places.

Faron, and much of northern and north-eastern Gotland are Protected Areas (sec. 1-110), described with related features. Faron has less than 1,000 inhabitants engaged in sheep raising and agriculture.

The major ports of Gotland are Visby and Slite. Smaller harbors include Burgsvik, Klintehamn, Ronehamn, and Farosund. Anchorage can be taken off many of the harbors and pilots can be obtained via the Visby Pilot Center or Tingstade Radio (57°44'N., 18°36'E.).

Hoburgs Bank, extending from the southern extremity of Gotland for about 50 miles, has

depths of 9 to 20 fathoms. Patches of 6 1/2 and 7 fathoms lie on the bank about 20 and 27 1/2 miles southward of Gotland.

An Ammunition Dumping Ground, 20 miles square, lies with the center about 54 miles south-southeastward of Gotland.

CAUTION.—Fishing for salmon with drift nets is conducted at night for about 10 miles off the coast of Gotland, between March 15 and June 15.

Depths in the approach channels leading to the smaller harbors are unreliable during the spring thaw. Ice pressure often fills the channels with large boulders.

Buoy markings conform to the new (1965) Swedish system.

NAVIGATION

4-2 From a position on the coastal track (sec. 3-2), about 8 miles south-southeastward of Olands Sodra Udde, a course of 030° for 105 miles leads over a least depth of 20 fathoms to a position about 5 miles west-southwestward of Visby.

From a position on the coastal track (sec. 1-139), about 7 miles southeastward of the southern extremity of Gotland, a course of 041° for 48 miles leads to a position about 6 miles east-southeastward of Ostergarnsholm light structure. Thence a course of 329° for 19 miles leads to the pilot cruising grounds southward of Slite (57°43'N., 18°49'E.).

The least depth on the tracks, 8 fathoms, is about 8 miles southeastward of Ronehamn (sec. 4B-13). The nearest coastal approach is 4 miles eastward of the southern peninsula of Gotland.

Detailed navigational information pertaining to port approaches is included in the principal description of the ports.

WINDS-WEATHER

4-3 Gotland has a very temperate climate. Northerly and westerly winds prevail on the west coast in late summer and autumn, easterly winds during spring and late fall. A southerly wind blows along the northeastern coast during the summer months.

Precipitation is slight, with the west coast getting more rainfall during the summer and autumn. Fog occurs chiefly in winter and spring.

CURRENTS-WATER LEVEL

4-4 There are only weak surface currents around Gotland. Strong westerly winds cause current direction changes. Between Gotland and Sweden an average 1/2-knot current sets south-southwestward.

The water level varies about 1 foot between mean and low water. Southeasterly winds lower and northwesterly winds raise the level.

ICE

4-5 Drift ice may block Burgvik and Klintehamn harbors between January and March.

PART A. GOTLAND, WEST COAST

4A-1 HOBURG (56°55'N., 18°09'E.), the southwestern extremity of Gotland, is a limestone cliff about 120 feet high divided by a deep cleft. Revudden, a low point on the southwestern side of the cliff, is marked by a tower with a radar reflector. A fog signal is sounded at the tower.

KLEVEN, a high hill, stands about 1 mile northeastward of Revudden. Hoburg Light is shown, and a radiobeacon transmits, from a tower on Kleven.

COAST-GENERAL

4A-2 The west coast of Gotland lies between Hoburg and Vialmsudd (57°55'N., 19°01'E.), for descriptive purposes. The coast from Hoburg extends northward for about 37 miles to Nyrevsudd. Burgsviken, a bay about 8 miles from Hoburg, forms the only major indentation along this coast. Stora Karlso, an island about 23 miles north-northwestward of Hoburg, is the only prominent feature off this coast.

The coast from Nyrevsudd turns north-northeastward for about 40 miles to Vialm-

sudd. This coast is indented about 9 miles westward of Vialmsudd by Kappelshamnsviken Bay. Hallshuk, a prominent point marks the northwestern side of the bay.

DEPTHS-DANGERS

4A-3 The coast between Hoburg and Nyrevsudd (sec. 4A-6), is fringed by rocks and reefs and fronted by shoals of less than 3 fathoms extending 2 1/2 to 3 miles offshore. Buoys mark the outer edge of the shoals which are closely contained by the 10-fathom curve.

STORA KARLSO (57°17'N., 17°58'E.), and LILLA KARLSO, 2 1/2 miles east-northeastward, are light-colored, steep islands lying about 3 1/2 and 2 miles offshore, respectively. There is a least depth of 16 fathoms between the islands. Reefs extend about 1 mile northward and southward of Lilla Karlso. The 20-fathom curve, about 5 miles offshore, closes the coast between the islands. A light is shown, a fog signal is sounded, and a radiobeacon transmits from Stora Karlso. Submarine cables are laid between the islands and the coast.

The coastal waters between Nyrevsudd and Vialmsudd present no offshore dangers. The 40-fathom curve lies between 1 1/2 and 2 miles offshore.

NAVIGATION

4A-4 See section 4-2.

COASTAL FEATURES-LANDMARKS

4A-5 BETWEEN HOBURG AND NYREV-SUDDE (57°32'N., 18°07'E.), the coast is high, steep, and densely wooded. Stora Karlso and Lilla Karlso (sec. 4A-3), are prominent from about 15 miles offshore.

HOBURGSREV, with depths of 1 1/2 to 3 fathoms, marked at the southern extremity by a buoy, extends about 1 1/4 miles southward of Hoburg. A lighted whistle buoy with a radar reflector is moored about 3 miles southward of Hoburg.

The western side of the peninsula forming the southern end of Gotland consists of steep, barren chalk cliffs extending about 8 miles north-northeastward to Valar, the southern entrance point of Burgsviken. A light is shown from Valar.

BURGSVIKEN, an inlet extending about 5 miles northeastward of Valar, is 2 1/2 to 4 fathoms deep in the outer part with rocks and reefs encumbering the inner part. A 2 3/4-fathom shoal, marked close southwestward by a buoy, extends about 2 1/2 miles westward of Valar. Reefs, marked close southward by a buoy, extend about 1 mile off the northern entrance to the inlet.

BURGSVIK is a harbor at the southeastern corner of the inlet, about 1 1/2 miles eastward of Valar. A 440-foot pier in the harbor is reached through a buoyed entrance channel, 13 feet deep, in which vessels with a draft of 12 feet can berth alongside the eastern side of the pier. The western side of the pier has 10 1/2 feet alongside. An approach channel, marked by buoys, will accommodate vessels with a draft of 13 3/4 feet to anchorage off the harbor.

Range Lights lead through the fairways of the approach and entrance channels.

Anchorage, sheltered, can be taken in 4 fathoms, sand and clay, about one-half mile north-northeastward of Valar. Vessels with a draft of 18 1/2 feet can anchor safely. Anchorage can be taken in 2 1/2 fathoms, sand and clay, about one-half mile northward of the harbor.

See section 4-1. Pilots from the station at Ronehamn (sec.4B-13) can be obtained between 0600-1900 hours, on prior notice of at least 5-hours to Visby, close seaward of the outer shoals.

Supplies of fuel oils, provisions, and water are available. There is a 6-ton crane on the pier. Shipping is conducted with Stockholm.

The COAST for about 20 miles northward of Burgsviken is fringed by rocks and fronted by shoals extending about 2 miles offshore in places. Nasrevet, above-and below-water reefs, extends about 2 1/2 miles southwestward of Nasudden, a low point near the northern entrance of Burgsviken. A light is shown about 1 1/2 miles southwestward of Nasudden. Deppo, a detached 2-fathom patch marked by a buoy close westward, lies about 4 miles northwestward of Nasudden.

HAMMARUDD (57°16'N., 18°06'E.) is the southern point of a broad cape about 12 miles north-northwestward of Nasudden. Patches of 2 3/4 and 2 fathoms extend 2 miles south-

ward of the point. Stora Karlso and Lilla Karlso (sec.4A-3) lie off the cape. Numerous churches, best seen on the chart, serve as landmarks along this coast.

KLINTEHAMN, a harbor at the head of a bight about 8 miles north-northeastward of Hammarudd, is formed by a mole and a breakwater. The outer part of the northern side of the mole has a quay about 700-feet long. The inner mole has 4 1/4 to 6 1/2 feet alongside. Depths in the harbor are increased by westerly, and decreased by easterly winds. Strong southwesterly winds create a heavy sea. An approach channel, 14 1/2 feet deep, marked by buoys, leads northeastward to a position 250 yards off the molehead. The buoyed entrance channel, 14 1/2 feet deep, leads eastward to the quay. Vessels with a draft of 13 feet can enter the harbor and berth alongside the main quay. A basin close westward of the quay is about 14 1/2-feet deep.

Range Lights lead through the fairways of the approach and entrance channels. An approach lighted buoy, with a radar reflector, is moored about 1 3/4 miles southwestward of the molehead.

Anchorage, with an offshore breeze, can be taken in 5 1/2 to 8 fathoms, sand and clay, close westward of the Approach Buoy. Anchorage can also be taken by vessels with a maximum draft of 15 feet, in 3 1/2 fathoms, about one-half mile southwestward of the molehead. There is limited swinging room.

Pilots, stationed at Visby (sec.4A-8) or Ronehamn, can be obtained in the vicinity of the Approach Buoy. Prior arrangements are made with the Visby station. If a pilot is unavailable a red ball is displayed from the front beacon of the approach range. See section 4-1.

Supplies of provisions, fuel oils, and water in limited quantities are available. Minor repairs can be made. There is a physician in town.

4A-6 BETWEEN KLINTEHAMN AND NYREVSUDDE, about 9 miles north-northwestward, the coast is fronted by rocks, with shoals of less than 2 fathoms extending about 2 miles offshore. Buoys mark many of the shoals.

UTHOLMEN (57°26'N., 18°06'E.), is a low, bare islet lying about 1 mile offshore and 4 miles northwestward of Klintehamn. The islet is a prohibited area. A 2 1/4-fathom shoal, marked by buoys, extends about 2 miles southward of Utholmen. A light is shown from the northern end of the islet.

SKANSUDDE is a point about 1 mile eastward of Utholmen. A light is shown from the point. Shoals, partly awash and marked by buoys, extend about 2 1/2 miles northwestward of Skansudde. A fairway used by vessels with a draft of 17 feet, with local knowledge, leads between the shoals to Utholmen Anchorage and Klintehamn.

VASTERGARN, a harbor close eastward of Skansudde, is formed by an islet joined to the shore by a breakwater. The harbor, 6 to 6 1/2 feet deep, has a 620-foot pier with 6 1/2 feet alongside. A fishing harbor, 5 feet deep, lies close northward of the pier. An approach channel, 11 3/4 feet deep, leads northeastward between foul ground, marked by a beacon and buoy, to the outer harbor. The entrance channel, 6 1/2 feet deep, leads to the pier. Vessels with a draft of 5 feet can enter the harbor and berth alongside the pier.

Range Lights lead through the approach channel to the outer harbor and anchorage. A beacon aligned with the local church leads northeastward to the harbor entrance.

Anchorage can be taken in 2 fathoms, clay, about 3/4-mile southwestward of the harbor.

Pilots can be obtained from Visby (sec. 4A-8), giving at least 5-hours notice prior to arrival.

Supplies of provisions and water are available in limited quantities.

GNISVARD is a sheltered fishing harbor, about 6 feet deep, 4 miles northward of Skansudde. A channel, 6 feet deep, leads eastward to a 400-foot pier in the harbor. Vessels with a draft of 5 feet can enter the harbor and berth alongside the pier. Range lights lead through the channel.

NYREVSUDDE, about 1 1/2 miles northward of Gnisvard, is a prominent light-colored headland at the western extremity of Gotland.

4A-7 BETWEEN NYREVSUDDE AND HALLSHUK (57°56'N., 18°44'E.), a point about 32 miles northeastward, the coast is steep-to and wooded. There are no off-lying dangers.

Numerous churches, best seen on the chart, are prominent. Stavklint, a steep cliff about 2 miles northward of Nyrevsudde, is conspicuous. Submarine cables are laid to Hogklint, a point about 5 miles northeastward of Nyrevsudde. Gunfiring practice is conducted in an area extending about 8 miles seaward of Nyrevsudde.

VISBY (57°38'N., 18°17'E.)

4A-8 Visby, the county seat and principal harbor of Gotland, is a coastal port about 9 miles northeastward of Nyrevsudde.

NAVIGATION.—See section 4-2.

WINDS — WEATHER.—Stormy weather sometimes raises a considerable sea outside the harbor with resulting suction within the port.

ICE.—Ice seldom blocks the harbor.

CURRENTS—WATER LEVEL.—The current usually follows the wind direction. Maximum velocity is 2 to 3 knots. Protracted westerly storms raise the water level, which is lowered during easterly and southeasterly storms.

DEPTHS—DANGERS.—The approaches to port are free of dangers, with depths of 13 to 26 fathoms existing within 1 mile of the entrance. An entrance channel, 20 1/2 feet deep, leads close northward of 2 1/2-fathom patches lying within one-fourth mile off the southern breakwater head. Buoys, the outermost with a radar reflector, mark these dangers. Vessels with a draft of 18 feet can enter the harbor through the entrance, about 20 feet deep. The outer harbor is 16 1/2 to 19 1/2 feet deep; the inner harbor, 16 1/2 feet deep.

LANDMARKS.—Visby Cathedral, with a high tower and spires is conspicuous, as are several tall smokestacks on factories. Church ruins with pointed gables and a standpipe, the latter southward of Visby, are prominent.

HARBOR.—The harbor is formed by two breakwaters and a tongue of land from which the northern breakwater is a southwesterly extension. A spur extending northeastward from the head of the southern breakwater, forms a fishing basin. Finger piers, with 10 feet alongside, extend into the basin. A central pier, about 820 feet long, divides the port into outer and inner parts. The inner harbor, lying eastward and southeastward of the pier, has berths for coasters and passenger vessels (ferries).

AIDS TO NAVIGATION.—Lights in Range, 072°, shown at the pierhead and inner harbor, lead through the entrance channel. Lights are shown from the head of both breakwaters. A radiobeacon transmits from the light tower on the southern breakwater, reported to give good radar returns up to 16 miles.

Obstruction lights are shown atop radio masts near the town. An aviation light is shown about 4 miles southeastward of Visby.

PILOTS.—Visby, the pilot center for Gotland, has a station near the root of the southern breakwater where pilots are available between 0600-2200 hours and on request prior to arrival. The pilot vessel has a radio telephone. Pilots can be obtained close seaward of the outer shoals. A red flag or ball is displayed at the station when inclement weather prevents the pilot leaving the harbor.

ANCHORAGE.—Anchorage, with offshore winds, can be taken in 22 fathoms, clay and gravel, about one-half mile seaward of the breakwaters.

DIRECTIONS.—From about 5 miles west-southwestward of port, steer 072° on the entrance range alignment, remaining in the white sector of Visby Light. Approaching the breakwaters, steer a mid-channel course passing close northward of the buoys marking the shoals.

4A-9 VISBY, with a population of about 16,000, is a first port of entry.

Exports consist chiefly of farm produce, cement, and lumber. Imports include fuels, foodstuffs, fertilizers, and manufactured products.

BERTHS.—There is about 2,000 feet of quays with 16 1/2 feet alongside in the inner part of the harbor. About 1,700 feet of quays in the outer harbor have 16 1/2 to 19 1/2 feet along side. Vessels with a draft of 16 1/2 feet can lie alongside most berths.

Several cranes with a capacity of 5 to 15 tons are available on the quays. There are grain and sugar loading facilities. Tugs are available.

SUPPLIES.—Provisions and ships' stores are procurable. Fuel and diesel oils are available in limited quantities. Water is piped to the quays. Feed water is carried by water boat.

REPAIRS.—Minor hull and engine repairs are made. There are marine railways.

COMMUNICATIONS.—There are regular shipping services to Stockholm and Nynashamn, Sweden. There is no railroad. Busses connect Visby with the other towns of Gotland. There is an airport nearby with customs service.

DERATTING.—See section 1-4.

MEDICAL.—There is a hospital in town.

COASTAL FEATURES—LANDMARKS (continued)

4A-10 BETWEEN VISBY AND HALLSHUK (57°56'N., 18°44'E.), about 23 miles distant, the steep, wooded coast is indented by two bights, the larger affording sheltered anchorage. Depths of 9 fathoms exist less than 1 mile offshore along this coast.

SJALSO, a fishing harbor in an inlet about 4 miles from Visby, is formed by a breakwater affording shelter from northeasterly winds. A channel, 10 feet deep, leads eastward to a harbor quay and pier with 10 feet alongside. Vessels with a draft of 9 feet can enter the harbor and berth alongside.

Range lights lead through the approach and entrance channels.

An aeronautical radiobeacon (57°44'N., 18°24'E.), is located on the coast about 2 1/2 miles from Sjalso.

STENKYRKEHUK (57°49'N., 18°28'E.), the northwestern point of Gotland, is located about 12 miles north-northeastward of Visby. A light is shown from the point. Prominent churches stand southward of Stenkyrkehuk.

LICKERSHAMN, a fishing harbor at the head of a bight about 2 miles eastward of Stenkyrkehuk, is formed by a breakwater. The harbor, 6 1/2 to 11 3/4 feet deep, has berths with 6 1/2 and 13 feet alongside, the latter on the inner side of the breakwater. Vessels with a draft of 10 feet can enter the channel, leading southeastward to the harbor, and berth alongside.

Range lights lead through the channel.

IREVIKEN is a bight about 2 1/2 miles northeastward of Lickershamn. A 3-fathom shoal extends about one-half mile off the western shore. A submarine cable, laid across the shoal, is landed on the southwestern side of the bight.

HALLSHUK, about 11 miles northeastward of Stenkyrkehuk is the high, steep northern promontory of Gotland. Reefs fringe Hallshuk for about 800 yards offshore. A light is shown from the northeastern side of the promontory. Norsklint, a prominent light-colored wooded hill, stands about 1 1/2 miles southwestward of Hallshuk.

4A-11 BETWEEN HALLSHUK AND VIALMSUDD, a point about 9 miles eastward, the coast is steep-to with closely fringing reefs. Hallshuk promontory forms the western side of Kappelshamnsviken, a bay indenting the coast southward for about 6 miles. The eastern shore of the bay forms the western boundary of a protected area (sec. 1-110), extending northeastward.

KAPPELSHAMNSVIKEN, a bay entered between Hallshuk Light and Svarvnaset (57° 56'N., 18°52'E.), a point about 3 1/2 miles eastward, is easy of access and free of dangers. Gales from the northeast and northwest raise a dangerous sea. There are depths of 47 fathoms at the entrance of the bay decreasing to 7 fathoms about 2 1/2 miles from the head. Reefs fringing the shores of the bay are marked by buoys. A submarine cable is laid across the shoals at the head of the bay.

KAPPELSHAMN is a harbor on the western shore near the head of the bay. Limestone is exported from a pier with depths of 8 to 12 feet alongside. A 700-foot fishing pier in a sheltered basin has 5 to 6 1/2 feet alongside.

Anchorage can be taken in 3 fathoms, clay, southeastward of the main pier. The eastern part of this anchorage affords the best holding ground.

Pilots can be obtained, on prior notice to Storugns or Visby (sec. 4A-8), close seaward of the outer entrance to the bay.

Supplies of fuel oils, provisions, and water are available in limited quantities. There is a bus service to Visby.

STORUGNS, a harbor on the eastern shore near the head of the bay, lies within the Protected Area. Limestone is exported from a pier extending about 350 feet offshore. Vessels with a draft of 17 1/2 feet can berth along the southern side. Quays at the root of the pier have 13 3/4 feet alongside. Mooring buoys lie in 2 1/2 fathoms between the pier and quays. Kappelshamn Light is shown from the pierhead.

A basin, 4 fathoms deep, is formed by a mole lying about one-half mile northward of the pier. Vessels with a draft of 23 feet can berth alongside the mole.

Anchorage can be taken in 3 fathoms, clay, about 250 yards northward of the pier. Foreign pleasure craft can berth, or anchor off Storugns, for 24 hours.

Pilots from the station at Storugns can be obtained between 0600-1900 hours, and on request, at the outer entrance of the bay. Prior notice is necessary. The pilot boat has a radiotelephone.

Supplies of fuel oils, provisions, and water are available in limited quantities. There are cranes of 7-tons capacity on the quays.

BLASE (57°54'N., 18°50'E.), a sheltered, disused harbor about 1 1/2 miles southward of Svarvnaset, is formed by a breakwater and a pier extending about 450 feet offshore. A channel about 15 1/2 feet deep leads to the pier. Vessels with a draft of 14 3/4 and 13 feet can berth alongside the eastern and western sides of the pier, respectively.

Anchorage, open to northerly and northwesterly winds, can be taken in 3 to 4 fathoms, sand, close southwestward of the pierhead. Foreign craft can remain in the harbor for 24 hours.

4A-12 AR is a harbor about 3 1/2 miles eastward of Svarvnaset (sec. 4A-11). An islet fringed by rocks and reefs fronts the northwestern side of the harbor. A channel about 15 feet deep, marked by buoys, leads southward into the harbor, 14 feet deep, open to northeasterly seas. Vessels with a draft of 14 feet can enter the harbor and berth alongside a pier.

Nackviken Light, at the head of the harbor, leads through the approach fairway. Range lights, lead westward through the entrance fairway to the pier.

Anchorage can be taken in about 2 1/2 fathoms in the harbor. Foreign craft can remain in port for 24 hours.

Pilots can be obtained on prior notice to Visby (sec. 4A-8), or Storugns and board ships northward of Svingrund.

Supplies of provisions and water are available. There is a 3 1/4-ton crane on the pier.

VIALMSUDD (57°55'N., 19°01'E.), a point about 2 miles eastward of Ar, is fronted by Svingrund, above—and below—water rocks and reefs. A light marks the northern ex-

tremity of the reefs. Shoals of 3 fathoms extend about 1 1/4 miles northwestward of Vialmsudd.

ANCHORAGES

4A-13 UTHOLMEN.—Anchorage sheltered from northwesterly winds, can be taken in 3 1/4 to 7 1/2 fathoms, sand, close eastward of Utholmen.

OFF VISBY.—See section 4A-8.

IREVIKEN.—Anchorage, sheltered from southerly and easterly winds, can be taken in 7 to 11 fathoms about the middle of the bight.

PART B. GOTLAND, EAST COAST

4B-1 The east coast of Gotland extends from Vialmsudd (sec. 4A-12), southward and southwestward to Hoburg at the southern end of the island.

COAST—GENERAL

4B-2 The east coast of Gotland is generally uniform in height and wooded. Several islands and islets lie close offshore. The northeastern side of Gotland, forming a broad bight indented by numerous shoal bights and inlets, terminates southward in a bold headland, with Ostergarnsholm Island rising steeply seaward. Slite is the principal harbor on this coast.

The southeastern coast of Gotland trending southwestward from the prominent headland, is indented by several shallow bights lying between peninsulas. Anchorage can be taken in the lee of islets close offshore. Ronehamn is the principal harbor on this coast.

A Protected Area includes all of the northern part of Gotland to Slite. Foreign vessels may remain in the area for 24 hours.

DEPTHS—DANGERS

4B-3 There are no off-lying dangers seaward of the 20-fathom curve, which closes the coast between 3 1/2 and 5 miles off all salient points. The coast, fringed by rocks and reefs, is fronted by shoals of less than 5 fathoms extending about 2 1/2 miles offshore in places and closely contained within the 10-fathom curve. Buoys mark several steep-to detached patches of sand and gravel seaward of the coastal shoals.

Klints Bank (57°26'N., 19°36'E.), is a sandy bank with a least depth of 14 fathoms lying eastward of Gotland.

NAVIGATION

4B-4 See section 4-2.

FAROSUND

4B-5 Farosund, a navigable passage separating Gotland from the adjacent island of Faron, extends about 6 1/2 miles south-southeastward from Vialmsudd (sec. 4A-12), at the northwestern entrance of the sound.

Farosund is a Protected Area. Vessels must adhere to prescribed pilot channels. Docking and anchoring are permitted at designated places, described with related features.

ICE.—Ice blocks Farosund in severe winters between January and the middle of April.

CURRENTS.—A northerly or southerly current flowing in the entrances of the sound, sets westward or eastward, respectively. The water level rises in the autumn during northerly and westerly storms, and falls in the spring during prolonged southerly and easterly winds.

DEPTHS—DANGERS.—The northern approach fairway has a least depth of 25 feet. At the narrow northern entrance, 1-fathom shoals extend across the sound. A dredged channel, 18 feet deep, through the shoals will allow vessels with a draft of 16 1/2 feet to enter Farosund. Buoys mark the sides of the channel. The fairway through the sound leads over least depths of 24 to 30 feet. Detached patches of 1 3/4 to 3 fathoms, marked by buoys, lie close to the fairway.

About 2 1/4 miles northward of the southwestern entrance of the sound, the channel curves eastward to avoid Skarvgrund (57° 51'N., 19°06'E.), a low, barren islet surrounded by rocks and reefs. Flytan, awash, lies on the northeastern edge of the reefs and a stone beacon stands on the southwestern side of the islet. A secondary channel, 15 feet deep, lies close westward of Skarvgrund. Local knowledge is necessary.

The southern approach to Farosund, about 30 feet deep, lies westward of Bungeor (57° 50'N., 19°07'E.), a low islet surrounded by rocks and reefs lying about 1 mile southward

of the southeastern entrance point. A beacon stands in the center of Bungeor and a light is shown from the southern extremity. Vessels with a draft of 24 1/2 feet can proceed to the outer roadstead northward of the islet. Vessels, with local knowledge and a draft of 13 feet, can enter the sound through a channel off the southeastern entrance point.

WESTERN SIDE.—HAUREVLAR (57°54'N., 19°02'E.), is a point about 1 mile inside the northern entrance and opposite the dredged channel. A stone beacon marks the point. A light is shown southwestward of the beacon. The western shore of the sound is fronted by shoals of 1 1/4 to 2 3/4 fathoms. Buoys mark the outer edge of the shoals near the fairway.

STRA is a hamlet with a pier about 1 mile southward of Haurevlar. Vessels with a draft of 14 3/4 and 16 1/2 feet can berth along the northern and southern sides, respectively. There is an 8-ton crane on the pier. Foreign vessels can remain for 24 hours.

FAROSUND is a commercial harbor about 2 miles southeastward of Stra. The principal pier has depths of 12 1/2 to 19 1/2 feet, and 9 3/4 to 13 feet, along the northern and southern sides, respectively. Moorings are laid outside the pier. Two other piers have depths of 9 and 11 feet alongside. The Coast Artillery has jetties and a marine railway of about 500-tons capacity close northwestward of Farosund. Foreign vessels can berth at the commercial piers for 24 hours. Supplies of fuel oils, water, and provisions are available in limited quantities. There is communication with Stockholm by sea and bus service to other communities. A ferry plies between Farosund and Broa, on the opposite shore.

BUNGENAS (57°49'N., 19°06'E.), a high, wooded promontory about 1 1/4 miles long, forms the southwestern entrance of the sound. Shoals extending into the sound about one-half mile eastward from the northern side of Bungenas, are marked by a buoy and a light.

EASTERN SIDE.—The eastern side of Farosund, from a point about 1 1/4 miles northeastward of Vialmsudd (sec. 4A-12), to the southeastern entrance point is high, wooded, and indented by several shallow bights.

AURGRUND (57°56'N., 19°03'E.), an islet at the northeastern entrance, lies about 300

yards offshore. A light is shown from the islet.

NORRA GATTET, a point about 1 mile southward of Aurgrund, is located opposite Haurevlar at the eastern side of the dredged channel. The shore to Broa, a village about 3 miles southeastward of the point, is fronted by shoals marked by buoys at the outer edge. There is a ferry pier at Broa where foreign craft can berth for 24 hours. A light is shown from the pier.

RYSSUDDEN (57°51'N., 19°08'E.), a low, rocky, light-colored point about 2 miles from Broa, marks the southeastern entrance to the sound. Shoals extending northwestward from the point are marked by a buoy close northward of the fairway opposite Flytan. Rocks, awash, lie between Ryssudden and Bungeor Islet. Faro Missloper, an islet encircled by reefs, and Sodergrund, a 5-fathom shoal marked by a buoy, lie in the outer approaches to Farosund.

4B-6 AIDS TO NAVIGATION.—A lighted buoy, with a radar reflector, is moored in the northern approach fairway about one-fourth mile northward of the dredged channel. Lights in range, 179°, shown on the western side of Farosund, lead through the approach fairway and entrance channel.

Farosund Sodra Light, shown on Flytan (sec. 4B-5), aligned with Haurevlar Light, leads in the fairway through Farosund.

PILOTS.—See section 4A-12. Pilots are boarded northeastward of Svingrund and southward of Bungeor Light (sec. 4B-5), on advance notice of arrival. Pilotboats have radiotelephones.

ANCHORAGE.—Anchorage can be taken in 5 fathoms, sand, eastward of the fairway about 1 mile northward of Bungeor Islet. Southerly and southeasterly winds raise a heavy sea. Excellent anchorage is afforded in 6 1/2 fathoms, mud and clay, about one-fourth mile southeastward of Farosund Harbor. Foreign craft can anchor off the harbor for 24 hours.

Anchorage is Prohibited in Mined Areas (sec. 1-109) at the northern and southern entrances of Farosund. Vessels pass through the areas, best seen on the chart, during a thunderstorm at their own risk.

Submarine cables are laid across the sound within the entrances and adjacent to the mined areas. Their locations are charted.

DIRECTIONS—NORTHERN ENTRANCE.—On approaching Farosund from the northward, remain in the white sector of Aurgrund Light (sec. 4B-5), until Farosund Norra Range Lights are aligned, 179°. Steer on this alignment through the entrance channel, passing close westward of the lighted entrance buoy. Thence, with Haurevlar Light astern, steer 145° for Farosund Sodra Light. Passing close eastward and southward of the light, steer a course of 167° with the light sector showing white astern, through the southern entrance.

SOUTHERN ENTRANCE.—On approaching Farosund from the southeastward, steer for Bungeor Light, passing westward of Sodergrund. When about 1 mile southward of Bungeor, steer 347° through the entrance, thence follow the reverse of courses given for the northern entrance.

COASTAL FEATURES—LANDMARKS

4B-7 BETWEEN FAROSUND AND SYSNEUDD (57°23'N., 18°53'E.), a point about 27 miles south-southwestward, the coast forms a broad bight with numerous small bights and inlets fronted by islands and islets lying close offshore. Detached patches of 2 1/2 to 5 fathoms, marked by buoys, lie seaward of the islands. The outer patches, lying about 5 miles offshore, are closely contained by the 20-fathom curve.

GUNFIRING practice is conducted in an area about 6 1/2 miles off the coast between Farosund and Smojeudd, a point about 8 miles southwestward.

BUNGENAS, a harbor from which limestone is shipped from three piers, lies on the southwestern side of Bungenas promontory (sec. 4B-5), the northeastern extremity of Gotland. Chimneys near the piers are prominent.

Vessels with a draft of 19 1/2 feet can berth in 23 feet alongside the southern pier. The middle pier has 13 to 16 1/2 feet alongside and the northern pier 11 1/2 to 19 1/2 feet. Foreign vessels can berth at the piers.

Anchorage can be taken in 3 to 4 fathoms, sand and clay, about 200 yards off the piers. Foreign vessels can remain for 24 hours.

PILOTS.—See section 4B-6. On prior notice to Visby, pilots will board vessels southward of Britgrund (sec. 4B-7).

Supplies of fuel oils, provisions, and water are available. There are 7-ton cranes on the piers.

FURILDEN (57°46'N., 19°00'E.), a prominent, wooded island lying about 4 miles southward of Bungenas, is connected to the shore by a stone bridge. Skenholmen, a low island, lies between Bungenas and Furilden. Rocky shoals of less than 2 fathoms extend about 2 miles eastward of the island. Rute Missloper, a low, yellow rock marked by a mast beacon, lies at the outer extremity of the shoals. A buoy marks the southeastern side of a dangerous reef extending off Rute Missloper. Rutegrund, a 3 1/2-fathom shoal marked by a buoy, lies about 3 1/4 miles eastward of Furilden. The light on Flytan (sec. 4B-6), open eastward of Bungenas promontory, constitutes a clearing mark to avoid the dangers previously mentioned. Grauten, two white rocks marked by a light, lie on the outer edge of a reef extending about 1 mile southward of the southern end of Furilden. Britgrund, 2 1/2-fathom shoals marked by a buoy, lie about 1 1/2 miles westward of Grauten.

FURILDEN, a harbor on the western side of the island, has two piers with 19 1/2 and 20 1/2 feet alongside. A light is shown near the northern pierhead. Foreign vessels can berth alongside or anchor off the piers for 24 hours. Anchorage can be taken in 5 to 6 fathoms, sand and clay, about one-half mile westward of the piers. Southerly gales raise a heavy sea at the anchorage. Pilots can be obtained close seaward of Britgrund Shoal on prior notice to Visby.

SMOJEUDD (57°43'N., 18°57'E.), is a point at the southern entrance of Valleviken, a bight indenting the coast westward of Furilden. The bight, encumbered by rocks, reefs and islets, is 1 1/2 to 3 1/2 fathoms deep. Vessels with a draft of 20 feet can enter Valleviken westward of Britgrund and proceed north-northeastward to Furilden Anchorage.

SMOJEN, a harbor about one-half mile northeastward of Smojeudd, is open to easterly and southeasterly winds. Vessels with a

draft of 17 feet can enter the fairway leading westward to a pier and berth alongside. There is a 7-ton crane on the pier. Range lights lead through the fairway. Anchorage can be taken in 9 fathoms, sand and clay, close eastward of the harbor. With prior notice to Visby, pilots can be obtained close seaward of Britgrund.

KYLLAJ, a fishing harbor about 1 1/2 miles northward of Smojen, has a pier with 6 1/2 to 7 feet alongside. A channel 6 1/2 feet deep, marked by buoys, leads to the pier. Range lights lead through the fairway. Foreign vessels can berth at Kyllaj and Smojen.

ST. OLOFSHOLM, a disused harbor at the head of a peninsula about 2 miles southwestward of Smoljeudd, is fronted by rocks, awash, and reefs extending about 2 miles southwestward of the peninsula. Buoys and beacons mark the dangers. A prominent windmill stands near the harbor.

HIDE, a harbor at the head of a bight about 1 1/2 miles northwestward of St. Olofsholm, has a pier with 11 feet alongside. Anchorage can be taken in 2 3/4 fathoms, sand and clay, close southwestward of the pierhead. Foreign vessels can berth or anchor for 24 hours. Pilots can be obtained seaward of Majgu (sec. 4B-8), on prior notice to Slite or Visby stations.

SLITE (57°43'N., 18°49'E.)

4B-8 Slite, about 4 1/2 miles westward of Smojeudd (sec. 4B-7), is the principal harbor on the east coast of Gotland. A coastal port, it lies at the southwestern side of a foul bight fronted by several islands affording partial shelter. Slite is outside the Protected Area although the islands and approaches to port lie within the area.

NAVIGATION.—See section 4-2.

WINDS—WEATHER.—Southerly storms raise a rough sea in the harbor.

ICE.—In severe winters, ice hinders shipping during February and March.

DEPTHS—DANGERS.—The dangers fronting Slite lie inside the 10-fathom curve, which closes the coast about 3 miles southeastward of the harbor. MAJGU, a round, barren island, lies about 2 miles southeastward of the port. A light is shown from the southern extremity, and a beacon stands in

the center of Majgu. Shoals of less than 2 fathoms extend between Majgu and Grundet, a low, grassy islet about three-fourths mile northwestward. A light is shown from the western side of the islet. Enholm, an island about 600 yards westward of Grundet, has prominent fortifications. Shoals of less than 2 fathoms, marked at the northern and southern ends by buoys, extend about one-half mile northward and southward of the island. Asunden, a grassy island about one-fourth mile northeastward of Grundet, is surrounded by shoals marked by buoys off the southwestern side. A 2 3/4-fathom patch, marked close westward by a buoy, lies in the channel about one-half mile westward of Majgu.

DJUPLOPPET, STORLOPPET, and SMALLHALET, are the three buoyed channels leading into Slite. Djuploppet, 23 1/2 feet deep, leading between Enholm and Grundet, is available to vessels with a draft of 22 1/2 feet. Storloppet, leading close westward of Enholm, is about 22 feet deep and available to vessels with a draft of 20 feet. Smallhalet, leading across the shoals between Grundet and Asunden, is available to vessels with a draft of 12 1/2 feet. There is 23 1/2 feet at the harbor entrance where the channels converge and in the approaches to the Cement Harbor.

ASPECT—LANDMARKS.—The coast around Slite is wooded and of uniform height. There are several high smokestacks, silos and a standpipe are prominent. A church, inland, appears as a lighthouse from the offing.

HARBOR.—The harbor is formed by two converging piers with an entrance about 130 feet wide. The harbor is about 10 to 16 1/2 feet deep. Quays and finger piers at the head of the harbor, and a small shipyard at the southern part, have about 10 feet alongside. The two piers, about 525 and 425 feet long, have 11 1/2 to 19 feet alongside their inner sides.

The Cement Harbor, about one-fourth mile northward, has two piers and a quay close southward fronting the works. Buoys mark the edge of shoals northward and eastward of the piers. Buoys mark the eastern side of shoals lying between the quay and Slite harbor.

AIDS TO NAVIGATION.—Lights in Range, 320 1/2°, are shown from the Cement Harbor. Lights in Range, 267°, are shown from the head of Slite Harbor.

PILOTS.—Pilots can be obtained at a station close southward of the piers in Slite harbor between 0600-1900 hours, also at other times on request to Slite and Visby. Pilots are boarded in the approaches southward of Majgu. There is a radiotelephone on the pilot vessel.

4B-9 ANCHORAGE.—Anchorage can be taken in 3 1/2 to 4 fathoms, sand and clay, about one-half mile westward of the southern end of Asunden. A submarine cable from Slite is laid between Enholm and Asunden across the southern part of this anchorage.

Anchorage is Prohibited in a Mined area (sec. 1-109) extending from the pilot station close southward of Slite, eastward to the southern end of Asunden and including Enholm and Grundet.

CAUTION.—Vessels pass through the mine area during a thunderstorm at their own risk.

DIRECTIONS.—Djuploppet is entered southward of Majgu by aligning a church located about 2 1/2 miles northward of the light with the eastern side of Enholm. Pass close westward of the buoy marking a 2 3/4-fathom patch opposite Majgu, thence steer a mid-channel course between Enholm and Grundet. From northwestward of Grundet, steer 320 1/2° on the entrance range leading to the Cement Harbor. When opposite Slite, a course of 267° leads from this range through the entrance of Slite Harbor.

The approaches through Storloppet and Smallhalet are best seen on the chart.

4B-10 SLITE, with a population of about 2,500, is a first port of entry.

Exports include cement, timber, pulp wood, and grain. Imports include coal, fuel oils, fertilizers, foodstuffs, and general cargo.

BERTHS.—The northern pier is about 525 feet long with 23 1/2 feet along the northern side. The southern side has 11 1/2 to 19 feet alongside. The southern pier, about 425 feet long, has berths with 16 1/2 to 18 1/2 feet alongside. The northern and southern piers at the Cement Harbor, each about 330 feet long, have 23 1/2 and 21 feet alongside,

respectively. Oceankajen, about 1,150 feet long, has three berths with 23 1/2 feet along side.

Cranes with a capacity of 4 and 7 1/2 tons are available at the Cement Harbor. The piers at Slite have cranes of 5- and 16-tons capacity. A tug is available.

SUPPLIES.—Provisions and fuel oils are obtainable in limited quantities. Water is piped to the piers and quays.

REPAIRS.—Minor repairs can be made.

COMMUNICATIONS.—Shipping services are conducted with Stockholm and harbors of Gotland. There are bus connections with other island towns.

DERATTING.—See section 1-4.

MEDICAL.—There is a physician in town. The nearest hospital is located at Visby (sec. 4A-9).

COASTAL FEATURES—LANDMARKS (continued)

4B-11 BETWEEN SLITE AND GROGAR-NSHUVUD (57°27'N., 18°53'E.), a prominent point about 16 miles southward, the wooded coast is irregular and fringed by rocky shoals extending as far as 1 1/2 miles offshore. Gothem Church, about 8 miles southward of Slite, is prominent.

BOTVALDVIK, a fishing harbor about 7 1/4 miles southward of Slite, is formed by two breakwaters. The harbor is about 10 feet deep with 11 1/2 feet at the entrance. A pier in the harbor has 10 feet alongside. Range lights lead west-southwestward to the pier. Anchorage can be taken in 2 1/4 fathoms, sand and clay, off the breakwaters. Pilots can be obtained from Slite (sec. 4B-8).

HAMMARUDDEN, a point about 7 miles southward of Botvaldvick, is fronted by rocks, awash, and shoals of less than 2 1/2 fathoms extending about 3 miles northeastward of the point. Anesbadar, marked by a buoy, is the outer shoal of 1 1/4 fathoms.

KATTHAMMARSVIK, a fishing harbor about 3 miles southeastward of Hammarudden, is formed by two breakwaters. A pier, 525 feet long with 10 and 10 1/2 feet alongside, is located close northeastward of the harbor. Vessels with a draft of 9 1/2 feet berth at the pier. Range lights lead to the pier and harbor. A pier in the harbor has 6 feet alongside. Anchorage can be taken in 3 1/4 to

4 1/4 fathoms, sand and clay, about one-half mile northward of the main pier. A channel for vessels with a draft of 16 1/2 feet leads to the anchorage. Pilots are obtained from Slite (sec. 4B-8).

GROGARNSHUVUD, about 3 miles east-southeastward of Hammarudden, is a high, barren promontory, steep-to on the northern side.

The COAST between Grogarnshuvud and Sysneudd, (57°23'N., 18°53'E.) about 4 miles southward, forms a bold, broad headland conspicuous from the offing. Reefs, awash, and marked by a buoy, extend about 1 3/4 miles eastward of Grogarnshuvud. Torsburgen, a wooded, circular eminence about 225 feet high, with steep sides and a flat top, stands conspicuously about 5 1/2 miles southwestward of Grogarnshuvud.

HERRVIK, a fishing harbor about 2 miles southeastward of Grogarnshuvud, is formed by two breakwaters. The harbor, about 9 to 17 feet deep, has three piers with 10 to 13 feet alongside. A light is shown from the head of the western breakwater. Anchorage, open to northeasterly winds, can be taken in 5 to 6 fathoms, sand, close northeastward of the harbor entrance. Mines are laid off the harbor.

OSTERGARNSHOLM (57°27'N., 18°59'E.), a low island rising steeply seaward, lies about 2 1/2 miles eastward of Grogarnshuvud. A channel, about 36 feet deep, separates the island and mainland. It should not be used during the fishing season (sec. 4-1). Submarine cables are laid from the island southwestward across the channel. Briterne, shoals of 1 1/4 to 2 3/4 fathoms marked close northward and southward by buoys, extends about 2 miles northeastward of the island, and a detached 4 3/4-fathom patch lies about 1 mile northward. A lighted whistle buoy, with a radar reflector, is moored 2 1/2 miles eastward of the island.

Ostergarn Light is shown on the northeastern side of the island. A fog signal is sounded and a Radiobeacon transmits at the light. A light is shown on the western side of the island.

4B-12 BETWEEN SYSNEUDD AND NARSHOLMEN (57°13'N., 18°41'E.), about 12 miles southwestward, the wooded coast forms a

broad bight fronted by islets and shoals of 2 to 5 fathoms extending about 3 miles off-shore.

SANDVIKSHAMN, a small bight formed by the western side of Sysneudd, affords shelter from northerly winds to vessels with a draft of 16 1/2 feet eastward of 3-fathom patches in the entrance. Range lights on the southwestern side of Sysneudd lead clear of the dangers. Rocks, awash, lie about 1 1/4 miles off Grynge, the southwestern entrance of the bight. Range lights at Grynge lead clear of the rocks.

LJUGARN, a harbor on a point about 5 miles southwestward of Grynge, is formed by a breakwater. A curved pier on the western side of the breakwater has 6 1/2 to 13 feet alongside. A pier on the southern side has 16 1/2 feet alongside. A fishing harbor, westward of the breakwater, has two piers with 5 feet alongside. A pier with 10 to 15 feet alongside lies 1/2 mile northward of the fishing harbor. The harbor is open to easterly and northeasterly winds. Vessels with a draft of 23 feet can approach within 1 1/2 miles of the harbor entrance by aligning a beacon near the harbor with a church about 3 miles westward. Range lights lead northeastward through the entrance into the fishing harbor. A light is shown at the root of the breakwater. Anchorage can be taken in 3 3/4 to 5 1/2 fathoms, sand and clay, about 1 mile off the harbor. Pilots can be obtained from Ronehamn (sec. 4B-13).

LAUS HOLMAR (57°17'N., 18°46'E.), three low, grassy islets lying between 2 and 3 miles south-southeastward of Ljugarn, are surrounded by rocks and shoals extending about 1 1/4 miles eastward. Buoys mark the outer extremities of the shoals. A light is shown from the eastern end of the southern islet.

NARSHOLMEN, a barren peninsula about 6 1/2 miles southward of Ljugarn, is the southern extremity of a coastal outcropping commencing at Nabban, a point about 3 1/2 miles northward. Nar Light is shown from the southern end of Narsholmen. Range lights are shown at Djaupdy, about 1 1/2 miles southward of Nabban.

4B-13 BETWEEN NARSHOLMEN AND FALUDDEN (57°00'N., 18°24'E.), a point about

16 miles southwestward, the coast recedes forming a bight fronted by numerous dangers and shoals extending about 3 1/2 miles off-shore.

Range lights are shown at the entrances of fishing harbors on the coast between Narsholmen and Tomtbod Beacon about 6 miles west-southwestward. Local knowledge is necessary. A fog signal is sounded at a light about 1 mile westward of Nar.

RONEHAMN, a harbor about 7 miles west-southwestward of Narsholmen, is 9 to 15 feet deep, shoaling to the head. A pier about 500 feet long has 14 3/4 to 15 1/2 feet alongside. Smaller piers have 8 1/4 to 15 feet alongside. Vessels with a draft of 14 1/2 feet can enter the harbor and berth at the piers. Ice usually blocks the harbor in January and February.

The approaches are encumbered by dangers marked by buoys, lying within 3 1/2 miles of port. Fairways, marked by buoys, lead northward and southward between the dangers to the entrance channel, about 1 mile southeastward of the piers. Bankhalet, the entrance channel marked by buoys, is 15 1/2 feet deep and leads from the outer roads through an inner roads to the piers. The northern fairway leads west-southwestward from a buoy marking the outer shoals to Ronehamn Lighthouse, thence southwestward to the outer roads. Vessels with a draft of 14 1/2 feet can enter the fairway and proceed to the roads. The intricate southern fairway leads to the outer roads, passing westward and northward of Ytterholmen, a low, bare island 2 1/2 miles southward of port. The numerous dangers lying near the fairways are best seen on the chart. Local knowledge is necessary. Vessels with a draft of 12 feet can proceed in the fairway to an anchorage westward of Ytterholmen, thence with a draft of 10-feet to the outer roads.

Range lights in town lead through the entrance channel to the inner roads. Range lights in the harbor lead from the inner roads to the piers. Ronehamn Light is shown about 1 1/2 miles eastward of the piers.

Anchorage can be taken in 3 3/4 to 4 1/2 fathoms, clay, in the outer roads about 1 mile southeastward of the piers and close eastward of Bankhalet. Anchorage can be taken in 2 3/4 fathoms, clay and gravel, in the inner roads about 700 yards southward of the piers. Vessels with a maximum draft of 13

feet can anchor. Anchorage can be taken in 3 1/2 to 4 fathoms, clay, about one-half mile westward of Ytterholmen. Gansvik Anchorage, about 1 1/4 miles west-northwestward of Ytterholmen, affords sheltered anchorage in 2 1/4 to 2 1/2 fathoms, sand. Vessels with a draft of 11 1/2 feet can proceed to this anchorage from the outer roads.

Anchorage is Prohibited in a Mined area off the entrance channel extending about 400 yards from the piers.

CAUTION.—Vessels pass through the mined area during thunderstorms at their own risk.

Pilots are obtained between 0600-1900 hours from a pilot station in the harbor. Pilots can be boarded at the northern approach to port, seaward of the outer shoals. There is a radiotelephone.

Supplies of provisions, water, and fuel oil are available in limited quantities.

GROTLINGBOUDD (57°07'N., 18°27'E.), a peninsula about 3 1/2 miles south-southwestward of Ronehamn, is marked by a beacon and windmill at the eastern extremity. An islet, the northern end marked by a beacon, lies close eastward of the peninsula and about 1 mile westward of Ytterholmen. Soderbrieten, with a least depth of 2 fathoms marked close eastward by a buoy, lies at the outer edge of shoals extending almost 4 miles eastward and southward of Grotlingboud. A 7 1/2-fathom bank lies about 7 miles eastward of the peninsula.

FALUDDEN is the outer point on a coastal spur about 7 1/2 miles from Grotlingboud. A light is shown and a fog signal is sounded from the point. An isthmus (sec. 4-1), lies northwestward of Faludden. A 1 1/2-fathom reef, marked close eastward by a buoy, extends about 1 1/4 miles off the point.

4B-14 BETWEEN FALUDDEN AND BARSHAGEUDD (56°54'N., 18°12'E.), about 8 1/2 miles southwestward, the coast is lower and more wooded than on the western side of the peninsula forming the southern end of Gotland. Rocky shoals front this coast, which should not be approached within 3 miles.

VANDBURG is a fishing harbor, with a depth of 5 feet, about 4 miles southwestward of Faludden. Range lights lead into the harbor. Local knowledge is necessary. A church about 1 1/2 miles northward of Vandburg is conspicuous. Shoals partly awash, marked

by buoys at the outer extremities, lie about 2 and 3 miles eastward and northeastward of Vandburg, respectively.

HELIGHOLMEN (56°55'N., 18°17'E.), is a low, rocky islet lying close offshore about 6 miles southwestward of Faludden. A light is shown from the islet.

BARSHAGEUDD is a point at the southern extremity of the eastern coast of Gotland. Reefs partly awash, marked by buoys close seaward, extend about 1 1/2 miles southward of the point.

ANCHORAGES

4B-15 SKENHOLMEN.—Anchorage can be taken in 3 to 4 fathoms, sand and clay, between Furilden and Skenholmen. The anchorage is open to southwesterly winds.

SANDVIKSHAMN.—Anchorage can be taken in 3 1/4 to 4 1/4 fathoms, sand, by vessels with a draft of 16 1/2 feet steering northward for the ruins of a lime kiln at the head of the bight.

LAUS HOLMAR.—Anchorage, sheltered from easterly and southerly gales, can be taken in 2 3/4 to 5 fathoms, sand and clay, northwestward of the northern islets.

NARSHOLMEN.—Anchorage can be taken in 3 1/2 fathoms, sand, in the entrance of a bight close westward of Nar Light.

FALUDDEN.—Anchorage, sheltered from southerly gales, can be taken in 3 1/2 to 4 1/2 fathoms, sand and clay, about 1 1/2 miles northwestward of Faludden.

HELIGHOLMEN.—Anchorage, sheltered from northwesterly winds, can be taken in about 4 1/2 fathoms, sand and clay, southwestward of the islet.

PART C. FARON AND GOTSKA SANDON.

4C-1 Faron Island is described from its western extremity, northward and eastward to the eastern extremity, thence to Ryssudden at the southern extremity. The southwestern side of Faron is described with Farosund.

COAST—GENERAL

4C-2 FARON, about 10 miles long, and separated from Gotland by Farosund, is uniformly high and wooded. The northern coast is generally steep and light-colored. Avanas, the northeastern part of the island, is a broad

peninsula appearing from northward as white sandy hills. The entire coast is irregular, forming several bights where anchorage can be taken. Faro, the only village, is on the east coast.

The islands of Faron and Gotska Sandon are Protected Areas (sec. 1-110).

DEPTHS—DANGERS

4C-3 The western and northern coasts of Faron are free of dangers. Deepwater exists close seaward of all salient features. Off the northeastern peninsula rocky shoals extending about 1 3/4 miles offshore lie close inside the 10-fathom curve. The off-lying dangers are described with related features. The eastern coast is fronted by shoals, with detached shoals about 4 miles offshore closely contained within the 10-fathom curve.

COASTAL FEATURES—LANDMARKS

4C-4 BETWEEN FAROSUND AND HOLMUDDEN (57°58'N., 19°21'E.), the northeastern extremity of Faron, the coast is indented by several shallow bights encumbered by rocks. Lauterhorn is a low, steep-to point at the northern end of a bight extending northeastward from Farosund. A light is shown from the point and from the shore close southeastward. From Lauterhorn the coast trends about 4 1/2 miles northeastward to a peninsula forming the northern extremity of Faron. Digerhuvud, about 2 miles from Lauterhorn, is a prominent promontory.

NORSHOLMEN is a point between the northern and eastern end of Faron, about 5 1/2 miles east-southeastward. A mast beacon stands, and a light is shown from the point. Two bights lie eastward and westward of Norsholmen. The western bight is foul; the eastern is 2 to 5 fathoms deep, open to northeasterly winds. Ullahau are conspicuous sand hills near the head of the bight.

AVANAS (sec. 4C-2) the eastern prolongation of Faron, terminates at Holmudden, a point about 4 1/4 miles from Narsholmen. Faro Light is shown from the point. A fog signal is sounded and a radiobeacon transmits at the light. A partly concealed tower stands close westward of the light structure.

OFF-LYING DANGERS

4C-5 TORNBULLSHALLAN, a reef awash, marked by a buoy at the northern end, extends about 2 3/4 miles northward of Holmudden. Shoals of 2 1/2 to 5 fathoms extend northward of Avanas and about 2 1/4 miles eastward of Holmudden. A buoy marks the eastern edge.

SALVOREV, shifting shoals of sand, gravel, and rocks with changeable depths, extend about 6 miles northward of Tornbullshallan. Gales expose many of the shoals. The northern and western sides of Salvorev are steep-to. The 10-fathom curve lies less than 1 mile off the eastern side. Buoys mark the sides of the shoal. A lighted whistle buoy, with a radar reflector, marks the northern limits of Salvorev. An unmarked channel, about 3 fathoms deep, leads between Tornbullshallan and Salvorev.

4C-6 BETWEEN HOLMUDDEN AND RYSSUDDEN (sec.4B-5), a point about 10 miles southwestward, the coast recedes forming several bights fronted by reefs and detached patches. At the head of Kyrkviiken, the southernmost bight, is Faro village with a prominent church.

HAMMARSUDDEN (57°53'N., 19°11'E.), a point about 7 miles southwestward of Holmudden, forms the southeastern side of Kyrkviiken. Rocks, awash, front the point. Lavergrund, a detached 1-fathom shoal marked close eastward by a buoy, lies about 3 miles southeastward of Hammarsudden. Digergrund, a detached 3-fathom rocky shoal marked by a buoy close eastward, lies about 4 1/2 miles eastward of Hammarsudden. Patches of less than 1 fathom lie between Digergrund and the shore, north-westward.

RYSSUDDEN (sec.4B-5), a point about 3 miles from Hammarsudden, is the southern extremity of Faron.

GOTSKA SANDON

4C-7 GOTSKA SANDON (58°24'N., 19°12'E.), a wooded island about 140 feet high, lies

20 miles northward of Faron. The shores consist of sand dunes, with fringing shoals of 2 to 5 fathoms extending to the 10-fathom curve about 1 1/2 miles offshore. Two patches of 5 1/2-fathoms lie 1 1/2 and 3 miles off the northwestern point of Gotska Sandon. A buoy marks the inner patch.

A light is shown about one-half mile eastward of the northwestern point. A radiobeacon transmits at the light.

KYRKUDDEN (58°22'N., 19°20'E.), is a point at the eastern extremity of the island. A buoy marks the eastern edge of a 4 1/2-fathom patch lying 1 mile eastward of the point. A light is shown from the point.

HAMNUDDEN is a point at the southwestern extremity of the island. A light is shown from the point. A 3-fathom shoal, marked close southward by a buoy, extends about 1 mile off the point.

SANDO BANK, about 6 1/2 to 8 fathoms deep, extends 13 miles southward of Gotska Sandon. A 5-fathom patch lies in the center of the bank.

KOPPARSTENARNA (58°35'N., 19°09'E.), are three, sandy, 1-to 3-fathom shoals lying between 9 and 12 miles northward of Gotska Sandon. Buoys mark the southwestern and northeastern edge of the shoals. A lighted whistle buoy, with a radar reflector, marks the northwestern edge.

ANCHORAGES

4C-8 LAUTERHORN.—Anchorage can be taken in 10 fathoms, sand and clay, close southwestward of the point. The anchorage is open to northeasterly and westerly winds.

NORSHOLMEN.—Anchorage can be taken in 4 1/2 to 7 fathoms, sand and clay, close southeastward of Norsholmen.

KYRKVIKEN.—Anchorage, open to southeasterly winds, can be taken in 5 to 6 fathoms, sand, in the center of the bight.

KYRKUDDEN.—Anchorage, sheltered from northerly winds, can be taken in 7 to 10 fathoms, sand, in the lee of the point. Gales raise a heavy swell.

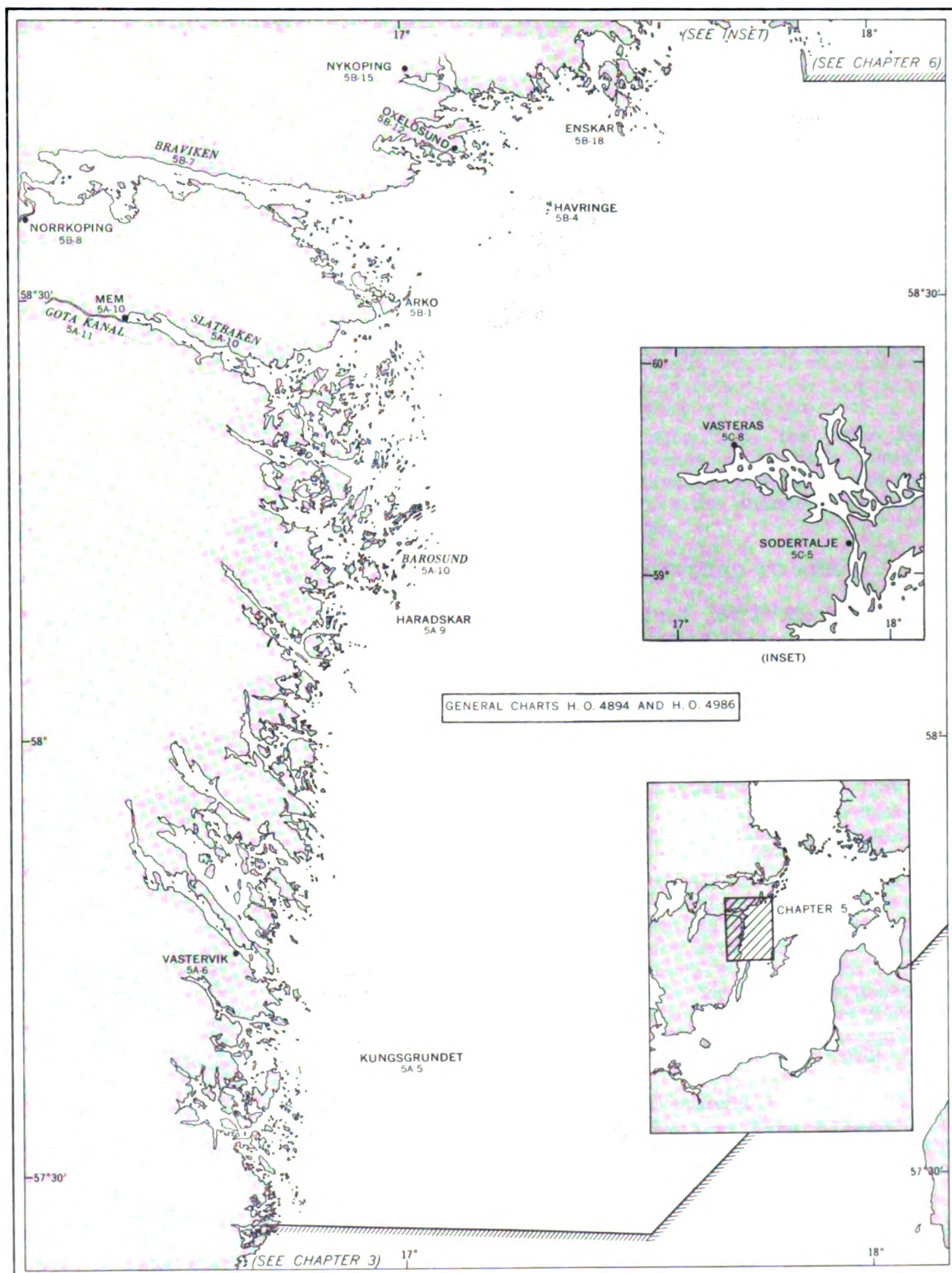


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
 Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 5—GRAPHIC INDEX

CHAPTER 5

KALMARSUND TO LANDSORT

- PART A. Krakelund to Arko.
PART B. Arko to Enskar
PART C. Enskar to Landsort

Plan.—This chapter describes the Swedish coast and approaches between Krakelund and Landsort. The sequence of description is from south to north.

GENERAL REMARKS

5-1 The coast between Krakelund and Landsort presents few natural landmarks seen from the offing. Innumerable islets and rocks fronting this coast are joined by shoals, with detached patches lying farther offshore. Local knowledge is required in gaining access to the several ports lying in the reaches of inlets penetrating the coast. Numerous beacons have been erected on points adjacent to the intricate channels leading to ports to facilitate safe navigation. Variable depths and uncharted shoals in coastal approaches indicate soundings are necessary.

The principal ports are Vastervik, Norrköping, Nyköping, Oxelosund, Södertälje, and Västeraås.

CAUTION.—Anchoring and fishing off this coast is considered dangerous because of the possibility of mines being adrift on the bottom.

Ice and changes in tortuous channels may cause the position of buoys to become unreliable.

NAVIGATION

5-2 From a position on the coastal track about 21 miles east-northeastward of Olands Norra Udde (sec. 3D-13), a course of 025° for about 110 miles leads to a position 2 miles eastward of Almagrundet (59°09'N., 19°08'E.).

This track passes over a least depth of about 19 fathoms near Almagrundet.

Detailed navigational information pertaining to port approaches is included in the principal description of the port.

WINDS—WEATHER

5-3 See section 2-3.

CURRENTS—WATER LEVEL

5-4 See section 2-4. The water level usually rises with northerly and northeasterly winds and falls with westerly and southwesterly winds.

ICE

5-5 See section 2-5. Ice often blocks coastal approaches to harbors along this coast during January, February, and March. Icebreakers keep the channels and harbors open to shipping.

PART A. KRAKELUND TO ARKO.

5A-1 Krakelund (57°27'N., 16°43'E.), is described in section 3C-9.

COAST—GENERAL

5A-2 The rocky, wooded, and irregular coastal archipelago between Krakelund and Landsort (58°44'N., 17°52'E.) should be approached with caution. Landmarks are few, soundings are uneven, and along much of the coast, obsolete. Nautical measurements are not entirely reliable. The coast northward of Krakelund is fronted by dangers between which fairways marked by lights and daymarks lead to local ports. The coast northeastward of Arko has less congested fairways, generally leading northward between islands to bights and inlets. Several lights shown off this coast mark the outer approaches and fairways leading to the principal ports. Islands and hills serving as aids in approaching the coast are described with related features.

A sheltered channel leading among the rocks and shoals between Krakelund and Landsort is available to vessels with a draft of about 19 feet. Pilots can be obtained

at Krakelund (sec. 3C-9) and Ido (sec. 5A-5) at any time.

CAUTIONS.—Local Magnetic Disturbances exist along much of this coast.

Submarine power cables from Gotland are landed on the coast westward of Kungsgrundet Light. A submarine cable is laid between Gotland and the coast northwestward of Landsort.

DEPTHS—DANGERS

5A-3 Depths, except off the southern part of this coast, are irregular. Detached shoal patches off the northern coast lie near banks of much greater depths. Landsortsdjupe, the deepest part of the Baltic, lies from 15 to 20 miles east-southeastward of Landsort.

Rocky shoals extend about 5 to 10 miles off the entire coast. The danger area lies close within the 20-fathom curve. Lights and buoys mark outlying or detached patches lying in the outer approaches to ports. These are described with related features and dangers.

NAVIGATION

5A-4 See section 5-2.

COASTAL FEATURES—LANDMARKS

5A-5 BETWEEN KRAKELUND AND ARKO (58°30'N., 16°58'E.), about 63 miles northward, the rocky, wooded coast is very irregular with several inlets of variable depths extending up to 20 miles inland. Uncharted rocky shoals lie close offshore. Buoys mark the outer shoals.

VINO, a wooded island about 3 1/2 miles northward of Krakelund and Huno Bote, a hill 3 miles northwestward of Vino, are prominent from the offing. Ljungskar, a bare rock marked by a light and beacon lies about 2 miles eastward of Vino.

BLACKAN, rocky 1-fathom patches lying about 4 miles northeastward of Krakelund, are marked by inner buoys and a lighted whistle buoy with a radar reflector close eastward. Approach fairways marked by lights and buoys, lead from seaward between shoals northward and southward of Blackan to the coastwise channel (sec. 5A-2), and minor local ports. Pilots can be obtained from the Krakelund station (sec. 3C-9), and

from Ido (sec. 5A-5), at any time for Kalmarsund or the coastwise channel.

GASFJARDEN, a bight northwestward of Vino, is approached from the coastwise channel through fairways 10 to 20 feet deep. Local ports at the head of inlets leading off the bight have piers with 10 to 17 feet alongside.

VERKEBACKSVIKEN (57°40'N., 16°39'E.), a narrow inlet entered about 9 miles northward of Vino, is fronted by patches extending about 7 miles offshore. Buoys mark the outer dangers. Handelop Island (57°41'N., 16°44'E.), and several islets lie in the entrance to the inlet. A light is shown and a beacon stands on Ido Stangskar, an islet about 1 1/2 miles eastward of Handelop. Buoys mark the outer side of shoals lying 4 and 5 miles eastward and southeastward of Ido Stangskar, respectively. A fairway leading between islets in the entrance and reaches of Verkebacksviken will allow vessels with a draft of 23 feet to proceed to quays at the head of the inlet. There are depths of 8 to 22 feet alongside. Anchorage can be taken in 13 to 22 fathoms, clay, off the quays. A quay at Skaftet harbor, about 5 miles west-southwestward of Handelop, has depths of 11 1/2 to 16 1/2 feet alongside. Vessels with a draft of 18 feet can anchor about one-half mile eastward of the quay. Pilots obtained from Ido, are boarded about 5 miles eastward of the station.

SPARO (57°43'N., 16°44'E.), an island from which a light is shown, lying close offshore about 2 miles northward of Handelop, is fronted by islands and reef-fringed islets for about 3 miles southeastward. Detached rocks and patches lie about 3 1/2 miles farther seaward, terminating in Kungsgrundet, awash. A light with a radar reflector is shown from Kungsgrundet. A fog signal is sounded and a radiobeacon transmits at the light tower. Rocks and shoals marked by a beacon and buoy lie about 2 1/4 miles northwestward and northward of Kungsgrundet, respectively. A dangerous wreck lies 2 miles southward.

IDO, about 1 mile eastward of Sparo, is the easternmost of four islands lying in the entrance of Gamlebyviken. Pilots on station at Ido can be obtained at any time with prior notice. A light is shown from Ido. Kroko and Grono Islands lie close westward of Ido

and Sparo, respectively. The area within 1 mile northward of the islands is encumbered with dangers best seen on the chart. Channels, marked by buoys, lead into Gamlebyviken between the dangers. The coastwise channel (sec. 5A-2), leads between Ido and Stickskar, an islet close north-northwestward. A light is shown from Stickskar. A beacon stands on Stangskar, an islet about three-fourths mile northwestward of Stickskar.

Submarine cables are landed on the coast within 1 1/2 miles southwestward of Ido. Other cables are laid between the islands.

GAMLEBYVIKEN (57°44'N., 16°42'E.), is a narrow inlet about 15 miles long, indenting the coast northwestward of Sparo, Norrlandet, a long peninsula forms the eastern side of the inlet, which has depths of 4 to 14 fathoms. A fairway through the middle of the inlet between patches marked by buoys, leads to Gamleby at the head of Gamlebyviken.

GAMLEBY, a harbor about 13 to 18 feet deep, has two piers with 13 to 18 feet alongside. Vessels with a draft of 18 feet can enter the harbor. Anchorage in 4 to 8 fathoms, mud, can be taken off the harbor. Pilots from Ido are boarded at any time, on prior notice, close seaward of the outer shoals. Provisions, fuel oil, and water can be obtained.

ALMVIK, a sheltered harbor on the western side of the inlet about 4 miles southward of Gamleby, is 26 to 33 feet deep. Two piers in the harbor have 6 1/2 to 8 feet alongside. Anchorage can be taken in 5 1/2 to 14 fathoms, mud, off the harbor.

VASTERVIK (57°46'N., 16°39'E.)

5A-6 Vastervik, is a harbor on the southwestern side of Gamlebyviken, about 2 1/2 miles within the entrance. The northwestern side of this sheltered harbor is formed by islets, connected by bridges, extending across Gamlebyviken. A northern swing bridge is opened for vessels proceeding through the inlet.

NAVIGATION.—From a position on the coastal track about 15 miles east-southeastward of Olands Norra Udde (sec. 3D-13), a course of 321° for 32 miles leads to the pilot cruising grounds in the vicinity of Kunsgrundet Light. This track passes over

a least depth of 12 fathoms about 5 miles southeastward of the lighthouse.

WINDS—WATER LEVEL.—The range in water level may differ 5 feet with north-easterly and westerly winds. Prevailing easterly winds lower the water level.

ICE.—See section 5-5.

DEPTHS—DANGERS.—There are three approach fairways leading from seaward to Vastervik. The southeastern fairway, leading close eastward of Ido Stangskar, is entered by vessels with a draft of 23 feet to Idosund and Sparosund. These narrow, navigable passages, lying close westward of Ido and Sparo, are entered by vessels with a draft of 18 1/2 and 14 3/4 feet, respectively.

The eastern approach fairway, leading northward of Ido and the shoals northeastward of Stangskar, is available to vessels with a draft of 23 feet. A branch of this fairway leading southward of Stangskar accommodates vessels with a draft of 15 3/4 feet.

The northeastern approach fairway, joining the eastern fairway about 1 mile northward of Stangskar, will allow vessels with a draft of 23 feet to enter the outer harbor of Vastervik.

Blockholm Sound, a passage less than 1 mile eastward of Vastervik between Norrlandet and Lusarna Island, has a buoyed channel 100 feet wide and 19 feet deep. Vessels with a draft of 18 feet can enter the inner harbor and Gamlebyviken through this channel.

CAUTIONS.—Currents with a velocity of 3 to 4 knots are encountered in Blockholm Sound. Submarine cables are laid across Idosund and Sparosund. A power cable, with a vertical clearance of at least 90 feet, spans Sparosund. A maximum speed of 4 knots is allowed in Sparosund.

Dangers close to fairways are described. Buoys moored on outlying dangers are marked according to the Swedish system and are best seen on the chart. All channels and fairways are similarly marked.

ORO SANKOE, a rock, and Vinkelgrund, 2 1/2-fathom shoals close southeastward, are marked by a buoy close eastward. Fyrken, a 1-fathom patch marked by a

buoy, lies in the fairway about 1 1/2 miles southeastward of Ido Stangskar (57°40'N., 16°47'E.). Buoys mark a 1-fathom patch in the fairway about 1 mile northwestward of Ido Stangskar. Numerous dangers, marked by buoys, lie close to the entrance fairways northward of Ido and Sparo.

KROOKSGEUND and N. BADEN are 3 3/4- and 1 1/2-fathom patches, marked by buoys, lying about 3 1/2 miles and 1 mile eastward and northward of Ido, respectively.

LANDMARKS.—The most conspicuous landmark seen approaching this wooded coast is a white beacon (57°43'N., 16°44'E.), on the western side of barren Sparo Island. In clear weather it is visible 18 to 20 miles. Kungsgrundet Light, (sec. 5A-5), with Storklappen Light, about 10 miles north-northwestward, are prominent. Closing the coast, Vastervik standpipe and the chimney of a paper mill in town become conspicuous.

5A-7 HARBOR.—Lusarna Island, lying across the inlet about 1 mile southeastward of town, divides Vastervik into inner and outer harbors. The outer harbor lies eastward of the island. It is over 45 feet deep but several patches of less than 2 fathoms marked by buoys lie close to the fairways. The shores of the harbor and island are fronted by reefs. A canal, opening from a foul bight on the northern side of the harbor, cuts across Norrlandet (sec. 5A-5). Vitudden is a point at the southwestern entrance of the bight. Islets lie in the fairway northward of Lusarna. Blockholms Sound (sec. 5A-6), between the island and the southern islet is the preferred fairway. The foul area southward of Lusarna is spanned by a fixed railroad bridge, with a vertical clearance of 6 feet, which crosses from the mainland to a quay on the eastern side of Lusarna. Piers extend offshore near the bridge. An oil berth 655-feet long has 26 feet alongside.

The inner harbor is about 33 to 50 feet deep, mud. The shores are fringed by shoals marked by buoys adjacent to the southern shore. Canals between the islets forming the northwestern side of the harbor (sec. 5A-6), lead into Gamlebyviken. The preferred fairway leads through the northern canal. A fishing harbor formed by breakwaters lies westward of the southern canal.

AIDS TO NAVIGATION.—Lights in range, 323°, shown from Sparo and Ido Stangskar, lead through the southeastern approach fairway. Vastervik standpipe, in the southern part of town, aligned 291° with a prominent white daymark on a rock off the southeastern extremity of Norrlandet, leads through the eastern approach fairway. Lights in range, 236°, shown from Stickstar and Sparo, lead through the northeastern approach fairway.

Vasterbaden (57°45'N., 16°45'E.), a rock from which a light is shown, marks the entrance of a deepwater channel leading from a branch of the northeastern approach fairway. Lights in range, 204°, shown from rocks and an islet about 1 1/2 miles and 2 miles from Vasterbaden, mark the sides of the buoyed channel.

Lights in range, 279°, shown from Korphallan, islets about 1 mile westward of the southern extremity of Norrlandet, lead through the entrance fairway. A light is shown from Borgo, an islet close eastward of Korphallan. Lights in range, 347 1/2° and 333°, on Vitudden (sec. 5A-7), lead through the entrance fairways to Blockholm Sound.

PILOTS.—Pilots have a station in town and on Ido. They can be obtained in the vicinity of the approach fairways, seaward of the outer shoals. Service at Vastervik is between 0900-1700 hours.

ANCHORAGE.—Anchorage can be taken in 5 1/2 to 13 1/2 fathoms, mud, south-south-eastward of Lusarna Island. Anchorage can be taken westward of the island in 5 1/2 to 8 fathoms, mud.

DIRECTIONS—Southeastern Entrance.—From a position on the approach fairway southward of Kungsgrundet Light (57°41'N., 16°54'E.), steer 323° on the approach range passing close northeastward of Ido Stangskar. With the light on Ido Stangskar astern, steer 331° for Idosund. On clearing the sound, steer 004° with Ido Light astern, for about 1 1/2 miles. Thence steer 320° for Vasterbaden and the deepwater entrance channel, or steer westward between the buoys close southward of Stangskar.

Eastern Entrance.—From a position on the approach fairway eastward of Kungsgrundet Light steer 283° for Sparo Beacon. When about 2 miles from the light tower, change course to 291°, on the alignment of Vastervik

standpipe and the daymark northwestward of Stangskar. Steer 291° until northward of Ido, thence proceed as previously directed.

Northeastern Entrance.—From a position on the approach fairway about 5 miles northward of Kungsgrundet Light, steer 236° on the alignment of Stickskar and Sparo Lights until about 1 mile from Stickskar. Thence steer a westerly course to pass close southward of Stangskar. In fair weather, a course of 263 1/2° leads from seaward to Vasterbadén. The deepwater channel and entrance fairway ranges have been described.

CAUTION.—It is inadvisable to use the Eastern and Northeastern Approaches during northeasterly storms.

5A-8 VASTERVIK is a town with about 18,000 inhabitants. There is a customs office and bonded storage.

Exports include timber, iron and leather products, pulpwood and oats. Imports include coal, coke, iron, oilcake, and fertilizers.

BERTHS.—A quay on the eastern side of Lusarna is about 655 feet long with 26 feet alongside. The Oil Harbor is 20 to 26 feet deep alongside the berths. The inner harbor has about 5,300 feet of quays with 13 to 20 feet alongside. The two principal quays are 820 and 1,000 feet long with 19 1/2 feet alongside. An oil quay has 19 1/2 feet alongside. Vessels with a draft of 18 and 23 feet can berth in the inner and outer harbors, respectively. There are several cranes of 3- to 10-tons capacity. The railroad serves most of the quays.

SUPPLIES.—Provisions and fuel oils are available. Potable and feed-water is piped to some quays. Charts are sold in town.

REPAIRS.—Minor repairs to hull and machinery can be made.

COMMUNICATIONS.—The town is connected with the Swedish railroad system. Shipping is conducted with Stockholm, Göteborg, and other Swedish and North Sea ports. A ferry lands in the outer harbor.

DERATTING.—See section 1-4.

MEDICAL.—There is a hospital in town.

COASTAL FEATURES—LANDMARKS (Continued)

5A-9 BETWEEN GRANSO (57°44'N., 16°43'E.), AND ARKO, about 47 miles northward,

the densely wooded coast is broken by numerous inlets and fjords fronted by an archipelago. Numerous lights mark the coastal waterway leading to Landsort. The few minor ports are at the head of inlets. Anchorage, with local knowledge can be taken in the lee of islets. Conspicuous landmarks are uncommon, with Storklappen, Haradskar, and Sandsankan Lighthouses first seen on making a landfall.

GRANSO is separated by a canal (sec. 5A-7), from the southeastern end of Norrlandet peninsula. Storklappen Light, shown from an islet about 8 miles northeastward of Granso, marks outlying shoals. Stora Bredgrund, shoals of 1 fathom and awash, lie about 1 1/2 miles southward of Storklappen. Buoys mark the northern and southeastern sides of Bredgrund. Hasselo Island, and a ridge north-northwestward, are prominent about 3 miles westward of Storklappen.

HALGENAS (58°00'N., 16°31'E.), a port at the head of an inlet about 15 miles northwestward of Storklappen, is approached through narrow fairways from eastward of Granso and westward of Storklappen. Two piers in the harbor have about 12 to 19 1/2 feet alongside. Vessels with a draft of 15 3/4 feet can enter the fairway eastward of Granso and proceed in the buoyed fairway to Halgenas. The Storklappen fairway is entered by vessels of 10 3/4 feet draft. Anchorage can be taken in about 6 fathoms, sand, 200 yards southeastward of the piers. Pilots can be obtained from Ido. Supplies of water and provisions are available.

VALDEMARSVIKEN, a narrow inlet extending about 10 1/2 miles northwestward, is entered about 14 miles northward of Storklappen. Numerous dangers lie in the approaches. Buoys, marking the outer dangers, are best seen on the chart.

HARADSKAR (58°09'N., 16°59'E.), an islet about 19 miles north-northeastward of Storklappen, is prominent approaching the inlet. A light is shown and a Pilot Station is located on the islet. Ljusgrund, a 3 1/2-fathom patch, marked by a buoy with a radar reflector, lies about 1 3/4 miles southeastward of Haradskar. Skallen, a 2 1/2-fathom patch, marked by a buoy, lies in the southeastern approach to Valdemarsviken.

VALDEMARSVIK, a harbor at the head of

the inlet, is entered through a fairway passing westward of Orskar Beacon (58°03'N., 16°53'E.), in the southern entrance of the inlet. Buoys mark narrows in the approaches. Shoals marked by buoys extend off the southern side of the harbor. Vessels with a draft of 16 1/2 feet can proceed in the fairway to the harbor where there are depths of at least 13 feet.

Valdemarsvik is a port of entry. There is about 1,650 feet of quays with about 14 feet alongside. There is a railroad connection and a 2-ton crane on one quay. Anchorage can be taken in 4 to 11 fathoms, clay, in a bight about 1-mile southeastward of port. Pilots are boarded at any time, on 5-hours prior notice, about 2-miles southward of Haradskar. Provisions, water, fuel oils, and charts are available.

CAUTION.—Vessels must not exceed a speed of 6 knots within 1 mile of the harbor.

5A-10 BAROSUND (58°11'N., 16°55'E.), about 3 1/2 miles northwestward of Haradskar, lies at the southern entrance of the coastal fairway leading through the archipelago to Arko, Soderkoping, and the Gota Kanal. Several fairways lead northwestward, branching off to minor harbors in bights and inlets. Local knowledge is required. Pilots for coastal fairways are contacted through Haradskar (sec. 5A-9), and board pilots at Kattilo (58°12'N., 16°54'E.). The fairway leading northward from Barosund to Arko is marked by numerous lights and buoys, but local knowledge is necessary. Vessels with a draft of 22 feet are accommodated. The coastal waters northeastward of Barosund contain many uncharted shoals. The coast is partially obscured by the archipelago. There are no safe entrances from the eastward. The outer dangers, best seen on the chart, lie in the vicinity of Sandsankan (58°19'N., 17°10'E.), a low islet, prominent from offshore, lying about 11 miles north-northeastward of Haradskar. A light is shown from the islet. Rocky shoals of 1 1/4- to 5-fathoms, marked by buoys close seaward, extend about 6 miles northward and southward of Sandsankan.

SLATBAKEN (58°26'N., 16°40'E.), with its entrance about 20 miles north-northwestward of Haradskar, is an important inlet leading

to Soderkoping and the inland waterways. Slatbaken is approached through a fairway skirting the southeastern coast of Vikbolandet, a high, wooded peninsula extending eastward to Arko. Lonshuvud, a steep promontory on the peninsula about 4 1/2 miles southwestward of Arko, is very conspicuous from the offing. A light is shown from Lonshuvud. The fairway, marked by lights and buoys, leads from Arko southwestward to the entrance of Slatbaken. There is a least depth of 17 feet in the fairway close northward of Bjorkskar Light (58°25'N., 16°48'E.).

Slatbaken is also approached from the southward through Barosund. Two approaches to the sound are available to vessels with a draft of 23 feet. A course of 336° from the pilot cruising grounds, about 2 miles southward of Haradskar, leads to Sando Light marking the eastern entrance of Barosund. Nygrund, a 2 1/2-fathom patch marked by a buoy moored about 2 miles southwestward of Haradskar, is passed close eastward. Buoys mark patches near the fairway on closing Sando, which should be approached in the white sector of that light at night.

The approach from eastward leads about one-half mile southward of Haradskar, thence westward between patches marked by buoys, and joins the south-southeasterly approach.

SNUGGHOLMEN (58°17'N., 16°56'E.), is an islet about 6 1/2 miles northward of Barosund. A light is shown from the northeastern side of the islet. The fairway from Barosund to Slatbaken leads from westward of the islet, over a least depth of 10 1/2 feet, to a junction northwestward with the fairway leading from Arko. Vessels with a draft of 10 feet are accommodated. The main fairway to Arko passes eastward of Snuggolmen, continuing northward where a branch turns northwestward and joins the fairway leading southwestward from Arko. Lights in range, 016°, mark the main fairway to Arkosund.

ETTERSUNDET, the narrow passage at the entrance of Slatbaken, has a least depth of 15 3/4 feet in the fairway. Buoys mark shoals extending off both sides of the sound. Stegeborgsund, a narrow passage about 2 miles westward of Ettersundet, has a least depth of 17 1/4 feet. Buoys mark the fairway.

Submarine cables are laid, and a ferry crosses Stegeborgsund. The current through both passages often attains a velocity of 4 knots.

MEM is a harbor at the head of Slatbaken, about 8 1/4 miles inside the entrance. It is a first port of entry. The outer harbor, at the entrance of the Gota Kanal, is about 12 1/2 feet deep and has a quay about 410 feet long with 11 3/4 feet alongside. The harbor is reef-fringed. A light is shown at the entrance. The inner harbor, a basin within the entrance lock, has about 660 feet of quays with 8 to 10 feet alongside. At Killingholmen, an islet about one-half mile eastward of Mem, there are two piers with 13 and 14 1/2 feet alongside.

Vessels with a draft of 14 3/4 feet can proceed in the fairway between Ettersundet and Mem. Light sectors lead through the fairway. Anchorage can be taken in 3 1/2 to 6 1/2 fathoms, clay, off Killingholmen. Pilots can be obtained at any time from Arko (sec. 5B-1) or Haradskar (sec. 5A-9). Provisions, fuel oils, and water are available.

5A-11 GOTA KANAL, about 103 miles long, is the longest canal in Sweden. It connects Mem with Sjotorp on Lake Vanern. About 47 miles of the canal are artificial. There are 58 locks, each 116 feet long, 23 1/2 feet wide, and about 9 feet deep. The highest stage of the canal is in Viken, where it is 300 feet above sea level. Forty-two bridges spanning the canal open for vessels. Vessels 105 feet long, 23 feet wide, with a draft of 9 1/4 feet, can proceed through the locks.

Soderkoping (58°29'N., 16°20'E.), on the southern side of the canal about 3 miles from Mem, has a quay with about 9 1/2 feet alongside. About 1 mile above Soderkoping is a drydock 292 feet long, 24 3/4 feet wide at the entrance, and 9 1/2 feet deep over the sill.

ANCHORAGES

5A-12 GASFJARDEN.—Anchorage can be taken, with local knowledge, in 2 to 16 fathoms, clay, in Gasfjarden.

SPARO and IDO.—Anchorage can be taken in 6 1/2 to 12 1/2 fathoms, clay, in the bight southwestward of Sparo. Anchorage is also available in 5 1/2 fathoms, clay, in the

sound close southward of Ido, clear of the submarine cables.

STADSHOLMEN.—Anchorage can be taken in 6 1/2 fathoms, clay, off Stadsholmen and Torro, islets lying about 1 1/2 and 3 miles north-northwestward of Storklappen. Fairways for vessels with a draft of 21 and 13 feet lead westward and northward of Storklappen to the anchorage.

VASTERVIK.—See section 5A-7.

BAROSUND.—Anchorage can be taken in 6 1/2 to 7 1/2 fathoms, clay, inside the entrance of the sound, also in 8 3/4 to 10 fathoms, clay, off Kattilo, an island about 1 1/4 miles northwestward of the entrance.

SNUGGHOLMEN.—Anchorage can be taken in 6 to 7 fathoms, mud, about one-half mile southward of the islet.

PART B. ARKO TO ENSKAR

5B-1 ARKO (58°30'N., 16°58'E.), an island lying close eastward of Vikbolandet (sec. 5A-10), is separated from that peninsula by Arkosund, a passage leading northwestward. The island is fringed by dangers except on the southwestern side facing Arkosund. Arko Beacon, a red and white painted beacon rising 115 feet at the eastern side of the island, is prominent. Viskar Tower, a disused lighthouse, painted white, standing about one-fourth mile southeastward of Arko beacon, is conspicuous from offshore. The Pilot Station, a prominent 3-story building painted yellow, stands on the southwestern promontory of Arko. Pilots can be obtained at any time via radio or radiotelephone. Coastal traffic board pilots close southeastward of the station.

COAST—GENERAL

5B-2 The irregular, wooded coast between Arko and Enskar (58°41'N., 17°29'E.), an island about 20 miles northeastward, forms a bight fronted by numerous dangers. The coast is penetrated by several deep and shallow inlets, through which fairways lead between various dangers to ports on the shores and at the head of the inlets. Numerous lights and ranges mark the fairways along this coast which should not be approached without local knowledge.

DEPTHS-DANGERS

5B-3 Rocky shoals, with depths less than 2 fathoms, extend about 9 miles eastward of Arko and 5 miles southeastward of Enskar. The coastal waters between these places contain innumerable unmarked rocky patches, many uncharted. Buoys mark the outer dangers, all lying close inside the 20-fathom curve.

OFF-LYING ISLANDS AND DANGERS

5B-4 HAVRINGE (58°36'N., 17°19'E.), a bare islet surrounded by several smaller islets, lies about 13 miles northeastward of Arko. Rocks, and shoals of less than 4 fathoms, extend about 4 miles eastward and southward of the islet. Buoys mark the outer edge of the shoals. Norra Krankan Light is shown from a rock about 2 1/4 miles east-northeastward of Havringe. Kopparnageln Light, with a radar reflector, is shown about three-fourths mile west-northwestward of Havringe. Vastra Korpen Light is shown from an islet close northeastward of Havringe. Lights in range, 296°, are shown from the northern side of Havringe.

Havringe Beacon, painted red with a white band near the top, stands about 100 feet above sea level on the northern side of the islet. The beacon is visible 12 to 14 miles. A beacon with a reflector stands on the northwestern point of the islet. A submarine cable is laid between the point and the coast northwestward. Local Magnetic Disturbances exist in the vicinity of Havringe and up to 16-miles southeastward.

Gustaf Dalen Light (58°36'N., 17°28'E.), is shown from a shoal about 5 miles eastward of Havringe. A fog signal is sounded and a radiobeacon transmits at the light structure. Pilots are obtained at anytime nearby on prior notice to Oxelosund Pilot Station.

NAVIGATION

5B-5 See section 5-2.

COASTAL FEATURES-LANDMARKS

5B-6 BETWEEN ARKO AND GULLANGSBERG (58°37'N., 16°56'E.), a steep-to promontory about 8 miles northward, lie numerous dangers and uncharted shoals. Kummelberg, a wooded elevation about 2 1/4 miles northward of Gullangsberg, and Hargo, a steep-

sided island about 1 mile westward, are prominent. Hargokälv Light is shown from an islet close southwestward of Hargo.

ARKOSUND (58°29'N., 16°57'E.), the passage westward of Arko, is entered close southward of the pilot station on Arko. Vessels with a draft of 18 3/4 feet enter Arkosund. A light is shown from Kuggviksskar, a prominent islet in the entrance of the sound. The coastal fairway from Krakelund leads close westward of Kopparholmen, an islet about one-half mile southward of Kuggviksskar, and southeastward of Kuggviksskar. Buoys mark the extension of this fairway, available to vessels with a draft of 11 3/4 feet, northeastward of Arko. Lights in range, 292°, shown from the northern side of Kopparholmen and from Vikbolandet, about 1 mile west-northwestward, lead through the southeasterly approach to Arkosund.

NORRA FALLBADAN (58°27'N., 17°06'E.), rocks awash, lie in the approach to Arkosund about 4 3/4 miles southeastward of Arko Beacon. A light is shown and a fog signal is sounded at a tower with a radar reflector. Pilots, on advance notice to Arko (sec. 5B-1), board ships seaward of the rocks.

ARKOBADEN, 1-fathom patches, lie about 7 1/2 miles eastward of Arko Beacon. A lighted whistle buoy, with a radar reflector, marks the southeastern side of the shoals.

ARKOSUND HARBOR, on the western side of Arkosund, has a pier with 16 feet alongside and 23 feet about 7 feet off the pier. Provisions and fuel oils are available in limited quantities.

Submarine cables from the southern archipelago are landed near islets southward of the harbor.

GRANSOSUND, a continuation northwestward of Arkosund, passes westward of Granso, an island about 2 miles from Arko. The fairway, leading between dangers marked by lights and buoys, is entered by vessels with a draft of 18 3/4 feet. A light is shown from the northwestern end of Granso. Two Fairways, marked by lights and buoys, lead north-northeastward and north-northwestward from Gransosund. The latter passes through Flaskosund, a passage about 3 1/2 miles from the northern end of Granso. The former passes close westward of Maro,

an islet about 2 miles from Granso, and continues along the coast toward Oxelosund. Both fairways accommodate vessels with a draft of 18 3/4 feet.

5B-7 BRAVIKEN.—Braviken, an inlet extending about 23 miles westward of Gullangsberg (sec. 5B-6), is encumbered with numerous dangers and is an area of frequent magnetic disturbances. The southern shore and head of the inlet is fringed by rocky shoals. Buoys mark the extent of dangers encroaching on the fairways through Braviken. Sectors of lights shown from salient points along the northern shore lead through the fairway. Range lights on islets off Kungshamn (58°38'N., 17°02'E.), lead through the northern entrance of Braviken. Mesen light is shown from rocks about 1 1/4 miles west-southwestward of Kungshamn.

NAVEKVARN is a harbor in a bight on the northern shore of Braviken, about 4 1/4 miles westward of Gullangsberg. A light is shown from the southeastern entrance of the bight. A pier in the harbor has about 6 1/2 to 15 1/2 feet alongside. The entrance fairway can accommodate vessels with a draft of 28 feet. The harbor is 6 1/2 to 16 feet deep. Anchorage can be taken off the pier in 6 1/2 to 8 fathoms, clay.

A light is shown from the northern extremity of Lono Peninsula, about 1 1/2 miles south-southwestward of Navekvarn.

FARJESTADEN is a harbor on the southern shore of the inlet, about 4 3/4 miles westward of Lono light. A dredged and buoyed channel, available to vessels with a draft of 13 feet, leads southward to a basin, 11 1/2 to 13 feet deep. Vessels with a draft of 12 feet can berth alongside a pier about 165 feet long.

SATERHOLMEN (58°38'N., 16°36'E.), an islet from which a light is shown, lies about 1 1/2 miles northwestward of Farjestaden. Braviken is one-half mile wide in the vicinity of the islet. Submarine cables, marked by range lights on the southern shore, are laid across the inlet near Saterholmen. A ferry crosses in the cable area, over which a maximum speed of 7 knots is allowed.

Lights are shown at Lovsgata, on the shore, about 4 1/2 miles from Saterholmen, and from Algersgrund, a shoal about one-third mile

southward of Lovsgata. The fairway is less than one-half mile wide here.

SANDVIKEN (58°40'N., 16°24'E.), is a harbor about 1 3/4 miles westward of Lovsgata. The harbor, about 8 1/4 to 17 3/4 feet deep has a pier 200 feet long. Vessels with a draft of 16 1/2 feet can berth alongside.

DJURON is a harbor at the northwestern end of Djuron Island, about 2 1/2 miles southwestward of Sandviken. A pier about 500 feet long, with 24 1/2 feet alongside, extends northwestward from shore. A pier and quay northeastward have 18 feet alongside. There are mooring rings ashore and a 5-ton crane is available on the pier.

Stora Juten, an islet marked by a light, lies in the fairway about one-third mile northwestward of Djuron.

NORRKOPING (58°36'N., 16°12'E.)

5B-8 Norrkoping, the principal harbor in Braviken, is located about 5 miles above the mouth of the Motala River, which discharges at the head of Braviken.

NAVIGATION.—From a position on the coastal track about 15 miles east-southeastward of Olands Norra Udde (sec. 3D-13), a course of 358° for 66 miles leads to a position about 15 miles south-southeastward of Havringe (sec. 5B-4). Thence a course of 292° for 11 miles leads to the pilot cruising grounds and approach fairway to Arkosund. This track passes over a least depth of 12 fathoms.

A course of 355° leads close westward of Havringe, southeastward of which pilots are available at any time for ships desiring a deepwater approach to Norrkoping.

WINDS—WATER LEVEL.—The mean water level is raised about 3 feet by prevailing easterly winds and lowered 2 feet by prevailing westerly winds.

ICE.—See section 5-5.

DEPTH—DANGERS.—There are three approach fairways leading to Norrkoping. The southeastern approach fairway leads close northeastward of Norra Fallbadan Light (sec. 5B-6), to the entrance of Arkosund. Vessels with a draft of 26 feet are accommodated. From Arkosund, vessels with a draft of 18 3/4 feet can proceed through Gransosund and Flaskosund (sec. 5B-6), to Norrkoping. The various dangers close to the fairways,

marked by lights and buoys, are described with related features.

A western deepwater approach fairway leads northward of Norra Krankan Light (sec. 5B-4), and southward of Grasskaren (58°37'N., 17°14'E.), rocks marked by a light close southward, about 2 1/2 miles west-northwestward of Havringe (sec. 5B-4). Between Grasskaren and Kungshamn (sec. 5B-7), there is a least depth of 80 feet in the fairway. A 2 1/2-fathom patch about one-fourth mile southeastward of, and a 5 1/4-fathom patch about 2 1/4 miles eastward of Kungshamn, are both marked by buoys close northward. The fairway skirting the northern shore of Braviken between Kungshamn and the roads off Norrköping leads close to dangers previously described. Vessels with a draft of 37 feet can proceed in the fairway. A canal leading from the roads southwestward to Norrköping is available to vessels with a draft of 34 feet. A winding channel, entered by vessels with a maximum draft of 23 feet, leads westward and southward from the roads to port. The canal and channel are marked by lights and buoys according to the Swedish system.

Approach fairways lead from seaward west-northwestward to Havringe. Vessels with a draft less than 23 feet approach on Havringe Range, 296°, passing over an unmarked 4-fathom patch about one-half mile from Havringe and near a dangerous wreck about 1 mile farther seaward. Vessels with a draft of about 26 feet enter between Havringe and Våstra Korpen (sec. 5B-4), or between Havringe and Lilla Rodbaken, an islet about one-half mile southward of Havringe Beacon.

Depth gages are located in Braviken harbors and on the Gryts Islands, lying close northward of the entrance channel leading to Norrköping.

5B-9 HARBOR.—Norrköping harbor, about 31 miles from the sea and 5 miles above the mouth of the Motala River, consists of quays on both sides of the river. Oil harbors lie adjacent to the entrance channels. A boat harbor, lined with quays, is 11 1/2 feet deep. A railroad bridge, separates the boat harbor and inner harbor. Pleasure craft enter the boat harbor through a draw, 49 feet wide. A bascule bridge, about 100 feet wide, for rail and road traffic, spans the

river about 1 1/2 miles downstream. The inner harbor, about 20 to 23 feet deep, is entered by vessels with a draft of 20 1/2 feet. Between the inner harbor and Lindo Canal are quays and oil harbors with jetties. Vessels with a draft of 29 1/2 feet can proceed to Quay No. 47, and with a draft of 23 feet to Quay No. 15.

Lindo Canal, at least 31 feet deep and between 150 to 200 feet wide, leads southwestward from Pampus Roadstead to Norrköping. The canal and its approach, about 3 1/2 miles long, and straight, has reduced the approach distance through the winding river channel. Vessels with a draft of 29 1/2 feet proceed through the canal at any time.

Handelo, an island formed by Lindo Canal, fronts the outer harbor. A narrow entrance channel, marked by lights and buoys, leads from Pampus Roadstead westward and southward of the island. Shoals from the mainland and Handelo extend to the edge of the channel. There are several oil terminals on Handelo with discharging facilities. The industrial outer harbor, extending northward from the inner harbor, includes oil harbors, and quays on the mainland southwestward of Handelo. There are depths of 26 1/4 to 29 1/2 feet in the oil harbors and about 21 to 29 feet in the outer harbor. A Cement Works is located on Handelo, eastward of the bridge. Opposite Ramshall, the western extremity of Handelo, is a chemical harbor, about 26 1/4 feet deep. Northward and eastward of the entrance to the inner harbor lie an oil harbor and Ohmans Quay, about 23 and 29 1/2 feet deep, respectively. Pampus Oil Harbor, at the outer entrance of Lindo Canal is about 34 1/2 feet deep.

Speed regulations are in effect between Ramshall and the boat harbor. A speed of 4 knots is allowed to the inner harbor and 3 knots in the harbor.

Pampus Roadstead, about 4 to 9 fathoms deep, lies between Djuron Island (sec. 5B-7), and the entrance channels leading to the outer harbor. A submerged pipeline, the landings marked by beacons, is laid from Djuron, southwestward. Vessels of deep-draft load and discharge in the roadstead.

AIDS TO NAVIGATION.—The approach channel, entrance channel, and Lindo Canal are marked by lights, buoys, beacons, and

ranges according to the Swedish system. Some aids have radar reflectors. Lights in range, 247°, shown from orange and white painted structures at the canal entrance, mark the edges of the approach channel leading from Pampus Roadstead. Lights in Range, 121°, lead through the channel from Ramshall to the southern entrance of Lindo Canal.

PILOTS.—Pilots can be obtained between 0900-1700 hours Monday through Friday from the Norrköping pilot station. Inbound vessels from the southern archipelago proceeding through Arkosund, or the branch fairways, can obtain pilots off Arko (sec. 5B-1). Vessels proceeding in the southeastern approach to Arkosund can obtain pilots close seaward of Norra Fallbadan (sec. 5B-6). Pilots can also be obtained clear of the shoals, eastward and southeastward of Havringe (sec. 5B-4), at any time.

ANCHORAGE.—Sheltered anchorage can be taken in 4 to 9 fathoms, clay, in Pampus Roadstead, clear of the approach channel.

DIRECTIONS.—From the pilot cruising grounds southeastward of Norra Fallbadan, a course of 292° leads on the Arko Approach Range (sec. 5B-6), close northward of Norra Fallbadan and through the buoyed fairway to Arkosund. From the sound various courses are steered through Gransosund, Flaskosund (sec. 5B-6), and Braviken (sec. 5B-7).

For a deepwater approach to port, steer 355° from Gustaf Dalen (sec. 5B-4) for about 2 miles, thence steer a westerly course passing northward of Norra Krankan Light and southward of Grasskaren Light. Various courses are then steered to Braviken (sec. 5B-7) and between the dangers (sec. 5B-8), to Norrköping. Approach details are given in Directions for Oxelosund.

5B-10 NORRKÖPING, with about 95,000 inhabitants, is a thriving, industrial city on both sides of a river spanned by several bridges. It is a center of the textile industry. There is a customhouse and bonded storage.

Exports include paper, pulpwood, timber, grain, metal products and machinery. Imports include fuels and fuel oil, metals, iron, steel, wool, cotton, fertilizers, and foodstuffs.

BERTHS.—General cargo quays are on the

southern side of the river, bulk cargo quays on the northern side. There are at least 5,000 feet of continuous quayage, with 16 1/2 to 29 1/2 feet alongside the quays, at the southern side of the Motola River. Ohmans Quay, the outer quay on the southern side of the inner harbor, is over 980 feet long with 29 1/2 feet alongside. Vessels with a draft of 26 1/2 feet can berth at Ohmans. The northern side of the river has about 6,000 feet of continuous quayage, including oil quays and dolphin berths to the Industrial Harbor opposite Ramshall. The quays have 17 1/2 to 29 1/2 feet alongside. The inlet leading to the superphosphate plant is 26 1/4 feet deep. The Cement Works on Handelo has a quay with 21 1/4 feet alongside. Pampus Oil Harbor has jetties accommodating vessels with a draft of 31 1/2 feet. Gastgivarehagen jetties accommodate tankers 600 and 700 feet long with a draft of 26 1/2 feet. The railroad serves all commercial quays. Numerous cranes on the quays are capable of lifting 1 1/2 to 10 tons. There is a 20-ton floating crane.

SUPPLIES.—Provisions and ship's stores are plentiful. Charts can be purchased. Water is available from hydrants on the quays and from water boats. Fuel and diesel oils are available at oil quays and from oil barges.

REPAIRS.—General repairs are made at Norrköping Wharf. A marine railway for vessels of about 2,500 d.w.t. and a diver are available.

COMMUNICATIONS.—The harbor and city are connected with the Swedish railroad system. Shipping is conducted with coastal and foreign ports. There is a customs airport outside the city. Several harbor tugs are available. Local icebreakers keep the harbor and approaches open.

DERATTING.—See section 1-4.

MEDICAL.—There are hospitals in the city.

COASTAL FEATURES—LANDMARKS (Continued)

5B-11 BETWEEN GULLANGSBERG (58° 37'N., 16°56'E.), AND ENSKAR (58°41'N., 16°28'E.), about 18 miles east-northeastward, the rocky, wooded coast is fronted by innumerable dangers and detached patches between which fairways lead to the principal ports. Several inlets, deep and shallow,

penetrate the coast. Lights and buoys marking the dangers near the various fairways are described.

MARSVIKEN, an inlet entered about 2 miles southwestward of Oxelosund, is fringed by shoals fronted by islets. Branch fairways lead from the northern entrance of Braviken at Kungshamn (sec. 5B-7), and from the Oxelosund approach fairway to the inlet. Vessels with a draft of 19 3/4 feet are accommodated in the fairway to an anchorage near the head of the inlet.

A channel, about 15 feet deep, marked by buoys, leads from the anchorage to a pier. Vessels with a draft of 11 3/4 feet can enter the channel and berth in 14 1/2 feet alongside the pier. Anchorage can be taken in 4 to 6 1/2 fathoms, clay, off the entrance channel.

OXELOSUND (58°40'N., 17°07'E.)

5B-12 Oxelosund, located on a peninsula about 7 1/2 miles west-northwestward of Havringe (sec. 5B-4), is an industrial port.

NAVIGATION.—From a position on the coastal track about 15 miles east-southeastward of Olands Norra Udde (sec. 3D-13), a course of 358° for 76 miles leads over a least depth of 11 fathoms to the pilot cruising grounds southeastward of Havringe outer shoals.

WINDS—WEATHER.—See section 2-3. The harbor, open to the southward, is sheltered by outer islands from strong southerly winds which cause some ground swell.

ICE.—Ice may hinder shipping between January and April, but the channels are kept open by icebreakers.

DEPTHS—DANGERS.—The deepwater approach fairways to Norrköping (sec. 5B-8), are common to Oxelosund. The coastal fairway from Arkosund (sec. 5B-6) leads north-northeastward between dangers marked by buoys and joins the entrance channel to Oxelosund about one mile eastward of Femore Island. Vessels with a draft of 11 3/4 feet are accommodated.

FEMORE (58°39'N., 17°07'E.), an island lying on the western side of the entrance channel to Oxelosund is fringed by dangers, marked by buoys and beacons, extending about 1 mile southeastward. Femorehuvud light is shown from the southern extremity

of Femore, about 1 1/4 miles southward of Oxelosund.

A fishing harbor on the eastern side of Femore is entered from the Oxelosund entrance channel. Range lights in the harbor lead westward through an entrance channel, about 10 1/2 feet deep, marked by buoys. An islet, marked close eastward by buoys, lies southward of the channel.

BJURHALS, an island on the eastern side of the entrance channel, opposite Femore, is fringed by rocky shoals marked by buoys on the northern and western sides. Ljungskär is an islet in the fairway close southward of Bjurhals. A light is shown from the southwestern side of the islet. Korsholm is an islet lying on the shoals close northeastward of Bjurhals. A light is shown from the northern side of the islet. Oxelosund Light is shown from the mainland about one-fourth mile northwestward of Korsholm. A light is shown from Korsholmen, an islet about 1 mile northward of Korsholm.

BETEN (58°39'N., 17°09'E.), an island about one-half mile southeastward of Ljungskär, lies close eastward of the entrance channel. A light is shown from the western side of the island. Lights are shown from Klashallan and Vinterklasen, islets on the western side of the channel about one-fourth and one-half mile southwestward of Beten. A 2-fathom patch, marked by a buoy, lies about one-half mile southward of Beten.

Vessels with a draft of 44 feet can reach Oxelosund via the northern approach at Havringe and vessels with a draft of 26 feet through the southern approach at Havringe.

OXELOSUND, a narrow passage between the mainland, Bjurhals, and Korsholm, is marked by buoys and available to vessels with a draft of about 10 1/2 feet.

An approach channel, used with local knowledge, leads from Havringe (sec. 5B-4), northwestward through the archipelago where a branch channel leads to Oxelosund and the iron works at the eastern side of Oxelosund harbor. Vessels with a draft of 16 1/2 feet and 28 feet are accommodated in the approach and branch channels, respectively.

A submarine cable, is laid parallel to the approach channel from Havringe. Other submarine cables are laid across Oxelosund.

The western approach fairway leading northward of Norra Krankan (sec. 5B-4), and southward of Grasskaren (sec. 5B-8), accommodates vessels with a draft of 44 feet.

LANDMARKS.—Hargberg, a conspicuous wooded hill with a bare spot on the southern side, rises on the northwestern side of Hartso Island (58°43'N., 17°28'E.). Smokestacks at the iron works, topped by obstruction lights, are prominent. The pilot watchtower, and the standpipe eastward of the city are conspicuous.

5B-13 HARBOR.—Oxelosund Harbor, at the western side of the peninsula, includes the iron works quays on the eastern side. Oxelosund (5B-12), connects both sides. Shelter is afforded in the harbor by off-lying islands. There are depths of 16 1/2 to 52 feet over mud and clay, with greater depths in the entrance. Lesser depths over shoals exist in the northwestern part of the harbor and on both sides of the connecting passage.

Quays extend from the western harbor to the Gas Harbor, a bight indenting the southern side of the peninsula, where there are several finger piers. Mooring buoys lie off the quays. Oxelosund passage is about 12 to 16 1/2 feet deep. The iron works harbor consists of about 2,000 feet of quays, open to easterly winds, fronted by depths of 24- to 45-feet.

MINES are laid in the southern entrance of Oxelosund between Ljungskar, the northwestern end of Bjurhals (sec. 5B-12), and Femore Island. Anchorage is prohibited in the area. Vessels passing over this minefield during a thunderstorm do so at their own risk.

CAUTION.—Vessels must not exceed a speed of 5 knots in Oxelosund passage. Strict harbor water pollution regulations are in effect.

AIDS TO NAVIGATION.—The white sectors of several lights (sec. 5B-12), lead through the entrance channels to Oxelosund. Details are given with Directions for entering port. Lights in Range, 320 1/2°, at the head of the harbor, lead to commercial quays.

PILOTS.—There is a Pilot Station located near the Gas Harbor at southern Oxelosund. Vessels arriving by coastal channels can obtain pilots at any time at the entrance of

Oxelosund or in the vicinity of Vinterklasen (sec. 5B-12). Pilots from the station at Oxelosund can be obtained at any time seaward of the shoals lying eastward and southeastward of Havringe, or northward of Norra Krankan (58°39'N., 17°23'E.), with an inshore wind.

ANCHORAGE.—Anchorage can be taken in about 11 fathoms, clay, between Beten (sec. 5B-12) and Ljungskar, clear of the mined area. Anchorage, open to northeasterly storms, can be taken in 4 1/2 to 7 1/2 fathoms southward and southwestward of Korsholmen Islet.

DIRECTIONS.—In the fairway westward of Norra Krankan steer 270° to pass northward of Norra Krankan. When abeam of Norra Krankan Light, change course to 275°, passing about one-half mile northward of the light tower. Thence steer 260° to a position about one-half mile southward of Grasskaren Light, whence a course of 303° leads in the approach fairway and white sector of Vinterklasen Light. When about 1 mile from Vinterklasen, change course to 324° for Ljungskar Light, proceeding in midchannel until the entrance range is aligned 320 1/2°. Steer on this range passing close eastward of the channel markers. This deepwater approach is preferred with strong inshore winds or poor visibility.

Other approach fairways leading northward and southward of Havringe join the main fairway eastward of Grasskaren. They are described with depths in section 5B-8. The Iron Works quays are approached by steering 245° in the white sector of Korsholm Light. The seaward approach to the iron works is common with that for Nyköping.

5B-14 OXELOSUND, with about 13,000 inhabitants, is a growing industrial city with an expanding iron and steel works exporting over 3 million tons of iron ore annually. The second largest gas works in Sweden is located in the harbor area. Oxelosund is a first port of entry with a custom examination station on Beten Island.

Exports include iron ore, wooden goods, paper, pulp, and lumber. Imports include fuels and fuel oil, scrap iron, limestone, and foodstuffs.

BERTHS.—There are about 11 quays with

a total length of 4,400 feet. Depths alongside vary from 7 1/2 to 45 feet. The western part of the harbor has 7 general cargo quays, the largest about 800 feet long with 29 3/4 feet alongside. Another quay is 485 feet long with 7 1/2 to 19 feet alongside. At the iron works are oil and coal quays about 455, 420, and 325 feet long with 39 1/4, 29 1/4, and 24 feet alongside, respectively. An iron ore and tanker quay, about 980-feet long, has 46-feet alongside. Molasses tankers also discharge alongside the deepest coal quay. There are railroad connections at all quays and numerous cranes with lifting capacities of 3-to 35-tons.

SUPPLIES.—Provisions, stores, and charts can be procured. Water is available at the quays or from water boats. Fuel and diesel oils are obtained at the oil berths.

REPAIRS.—Minor repairs can be made.

COMMUNICATIONS.—The harbor and city is connected by rail with the Swedish railroad system. Shipping is conducted with Baltic ports. Two combination icebreaker-tugs are available.

DERATTING.—See section 1-4.

NYKOPING (58°45'N., 17°01'E.)

5B-15 Nyköping Harbor is formed by the outer part of the Nyköping River, about 5 1/2 miles north-northwestward of Oxelosund. The city is situated on both sides of the river adjacent to the harbor.

NAVIGATION.—See section 5B-12.

WINDS-WEATHER.—See section 2-3. The harbor and approaches are sheltered.

ICE.—Ice in the channel and harbor may stop shipping at times between January and the middle of March. Icebreakers are available from Oxelosund.

TIDES-TIDAL CURRENT.—A weak current in the harbor may become troublesome during spring tides.

DEPTHS-DANGERS.—There are two approach fairways leading from seaward to the entrance channel. The principal fairway, accommodating vessels with a draft of 29 1/2 feet, leads west-northwestward between the archipelago extending eastward from Oxelosund and the dangers fronting the coast eastward of Nyköping. There is a least depth of 46 feet in the fairway to Orsbaken, an area clear of dangers extending about

3 miles southeastward of the entrance channel to Nyköping. A 5 1/2-fathom patch in the fairway to Orsbaken lies about 1 1/4 miles eastward of Kolhalsen (58°41'N., 17°11'E.) a rocky shoal about 1 1/2 northeastward of Oxelosund Iron Works. A light is shown from Kolhalsen. A white sector of the light covers a branch fairway leading to the iron works entrance fairway.

Only the dangers lying near the approach fairway to Nyköping are described. Portgrund, the outermost danger, is a 5 1/2-fathom patch, marked by a buoy, about 1 3/4 miles northward of Norra Krankan (sec. 5B-4).

LILLHAMMARSGRUND (58°40'N., 17°20'E.), are rocky shoals lying in the approach fairway about 3 1/4 miles north-northwestward of Norra Krankan. A light is shown from the center of the shoals. A buoy marks the eastern edge. A 5-fathom patch, marked by a buoy, lies three-fourths mile east-southeastward of the shoals.

TRUTBADAN, an islet about 2 3/4 miles northwestward of Lillhammarsgrund, lies one-half mile northward of the fairway. A light is shown on the islet. Several detached patches with a least depth of 1-fathom, marked by buoys, lie between the lights and close northward of the fairway.

NOREA MASKLUBBSHALLAN, an islet about one-half mile southward of the fairway, lies 1 3/4 miles west-northwestward of Lillhammarsgrund. A light is shown from the islet.

LEDSKAR, an islet one-half mile northward of the fairway, lies about 1 1/2 miles northeastward of Kolhalsen. A light is shown from the islet. The coastal fairway from Oxelosund, available to vessels with a draft of 10 feet, leads close westward of Ledskar.

SALGRUND (58°43'N., 17°09'E.), an islet from which a light is shown, lies at the inner end and close northward of the approach fairway through Orsbaken. Buoys mark the edge of several patches lying close southward of the approach fairway.

A secondary fairway (sec. 5B-12), for vessels with a draft of 16 1/2 feet, leads from Havringe to close eastward of Kolhalsen and joins the main fairway close southward of Salgrund.

The entrance channel, about 5 miles long,

19 3/4 feet deep and 100 feet wide, leads northwestward of Salgrund through a shallow inlet to Nyköping. Numerous buoys mark the sides of the dredged channel. Lights shown on dolphins serve as ranges for the several channel reaches. Vessels with a draft of 18 feet are accommodated in the channel. A branch channel, 13 feet deep, leads to the shipyard about 1 mile south-eastward of the harbor.

A submarine cable is laid across the entrance channel about one-fourth mile south-eastward of Nyköping.

CAUTION.—Vessels must not exceed a speed of 7 knots in the entrance channel.

LANDMARKS.—See section 5B-12.

5B-16 HARBOR.—The harbor, within the confines of the river, is lined with quays. A railroad swing bridge spans the harbor at the northern end. The harbor, clear of dangers to the bridge, is 17 3/4 to 19 3/4 feet deep. Three boat basins, about 5 to 7 feet deep, lie close westward of the entrance.

TRAFFIC SIGNALS.—A black ball by day and a red light at night, shown on a mast at the outer western part of the harbor, indicate vessels may not depart the harbor. Similar signals are shown at the outer entrance of the dredged channel when a vessel is departing port. Inbound vessels must remain clear of the channel until signal is struck.

AIDS TO NAVIGATION.—Hargberg (sec. 5B-12) and Enskar Beacon, by day, and Hartso-Enskar Light (sec. 5B-18), at night, are prominent aids approaching Nyköping from seaward. Havringe is an important light in using the secondary fairway to port. The white sector of Lillhammarsgrund, astern, leads to the entrance channel. Range lights at the northwestern side of the harbor lead into port.

PILOTS.—Vessels inbound from sea can obtain pilots at any time seaward of Havringe or northward of Norra Krankan. Vessels inbound via the coastal fairway obtain pilots southward of Oxelosund and off Vinterklasen (sec. 5B-12).

ANCHORAGE.—Anchorage can be taken in 3 1/4 to 4 1/2 fathoms, clay, in the north-western part of Orsbaken (sec. 5B-15), off the entrance channel. The anchorage is open to southeasterly winds. Sheltered anchorage

can be taken in 5 1/2 to 7 fathoms, clay, in the inlet westward of Orsbaken.

DIRECTIONS.—From the Havringe pilot cruising grounds steer 355° for Hargberg, and Enskar Beacon until abeam of Norra Krankan when Trutbadan (sec. 5B-15), bearing 301°, is aligned. Steer 301°, passing between the buoyed shoals, thence change course close northward of Lillhammarsgrund Lighthouse. With the latter astern bearing 117°, steer 297° through Orsbaken to the entrance channel.

At night, white sectors of Hartso-Enskar, Lillhammarsgrund, Masklubbshallan, and Salgrund (sec. 5B-15), lead in the approach fairways.

CAUTION.—The 5 1/2-fathom patch in the fairway southward of Ledskar should be avoided.

5B-17 NYKOPING, with about 26,000 inhabitants, is an industrial city containing flour, cotton and woolen mills. There is a custom house in port.

Exports include lumber, iron ore, corn, grain, and machinery. Imports include fuels, fertilizers, automobiles, and agricultural machinery.

BERTHS.—There is about 1,600 feet of quays with 17 3/4 feet alongside and 400 feet with 19 3/4 feet alongside. Vessels with a draft of 17 and 19 feet are accommodated. There are rail connections on the western quays. Two 5-ton cranes are available, and 2 grain elevators.

SUPPLIES.—Provisions and charts can be procured. Water and bunker oils are available on the quays.

REPAIRS.—Minor repairs can be made at the shipyard.

COMMUNICATIONS.—Nyköping is connected with the Swedish railroad system. Shipping is conducted with other ports of Sweden. A harbor tug is available.

DEBATTING.—See section 1-4.

MEDICAL.—There is a hospital in the city.

COAST (Continued)

5B-18 The coast extending eastward from Nyköping is fronted by innumerable dangers and several islands. Enskar, a sparsely wooded island, lies about 6 miles offshore and 7 miles northeastward of Havringe (sec.

5B-4). A prominent beacon stands on the southern promontory of Enskar and Hartso-Enskar Light (58°41'N., 17°29'E.) is shown close eastward of the beacon. A light is shown off the northwestern side of the island. Shoals extend about 2 1/2 miles southward of Enskar. An approach fairway from southward leads westward of the shoals and Enskar, where it turns north-northwestward and joins the coastal fairway in the vicinity of Bergo Islet (58°45'N., 17°25'E.). Buoys and range lights mark the fairway. Vessels with a draft of 22 feet are accommodated in the approach fairway and 10 3/4 feet in the coastal fairway from Orsbaken.

TVAREN, a deep bay, clear of dangers, extends from Bergo to the coast, about 2 1/2 miles northward. The approach fairway leads from Bergo through the southeastern part of the bay to Savo.

SAVO (58°46'N., 17°28'E.), an island forming the eastern side of Tvaren, is fringed by dangers. The fairway divides westward of Savo, the southern branch leading eastward through Savosund, a narrow passage close southward of Savo. Lights and buoys mark the branch fairway leading northward and southeastward of Savo where it rejoins the southern branch. Vessels with a draft of 13 3/4 and 22 feet are accommodated in Savosund and the northern fairway, respectively.

PILOTS for the southern approach fairway from seaward can be obtained from Oxelosund, clear of the shoals southeastward of Havringe, and eastward of Norra Krankan.

ANCHORAGES

5B-19 HAVRINGE.—Anchorage can be taken in 5 fathoms, clay, off the northwestern extremity of Havringe.

ARKOSUND.—Anchorage can be taken in 16 1/2 fathoms, clay, between Arko and Arkosund Harbor, also in 7 to 9 fathoms off the southern side of an island about one-half mile northward of the harbor.

BRAVIKEN.—Anchorage can be taken in suitable depths, clay, throughout the inlet.

NORRKOPING.—See section 5B-9.

OXELOSUND.—See section 5B-13.

NYKOPING.—See section 5B-16.

TVAREN.—Anchorage can be taken in suitable depths, clay, throughout the bay.

PART C. ENSKAR TO LANDSORT

5C-1 Enskar (58°41'N., 17°29'E.), is described in section 5B-18.

COAST—GENERAL

5C-2 Between Enskar and Landsort, about 13 miles east-northeastward, the coast is wooded, rocky, and irregular. Numerous islands and islets fringed by reefs and shoals front the coast which is penetrated by narrow inlets. The coast inside Enskar leads northward forming the western side of a long inlet leading to Sodertalje Harbor and the inland waterways system. Landsort (sec. 6A-1), is a salient feature approaching this coast. There are few natural landmarks.

Landsort lies within a protected area (sec. 1-110), which extends from 1 1/2 miles westward of Landsort, north-northeastward along the coast.

DEPTHS—DANGERS

5C-3 Numerous shoals and detached patches of variable depths lie between Enskar and Landsort. Lights and buoys mark many of the dangers near fairways. Shoals extending about 5 miles seaward of Enskar and Landsort are closely contained within the 10-fathom curve. There is deep water between the many dangers, but without local knowledge only the prescribed fairways should be followed, especially due to the existence of areas of local magnetic disturbance.

Uncharted shoals extend about 6 miles eastward of Enskar. Kopman and Gaddan are 3 1/4- and 3-fathom shoals, marked by buoys, lying about 2 1/4 and 4 1/2 miles southward and southeastward of Enskar, respectively. Several rocky patches of 1 3/4 to 5 fathoms, marked by buoys, lie up to 3 miles southward of Landsort. Karvasen, rocky patches of less than 1 fathom, extend about 1 1/2 to 4 1/2 miles east-southeastward of Landsort. A buoy and beacon mark the inner and outer end of the patches.

Gunfiring exercises are conducted in an area extending about 9 miles westward and north-northwestward of Landsort.

A submarine cable to Gotland is laid about 3 miles westward of Landsort.

COASTAL FEATURES—LANDMARKS

5C-4 Between Enskar and Landsort the coast turns abruptly northward, is broken by inlets fronted by dangers through which fairways lead to minor ports. The coastal fairway, after leaving Savosund (sec. 5B-18), leads generally eastward between dangers, marked by lights and buoys, and joins the approach fairway to Sodertälje about 4 miles northward of Landsort. Prominent landmarks are Storö, a high, barren island about 2 1/2 miles east-northeastward of Enskar and Lacka Tower (58°45'N., 17°34'E.), painted red with a pointed top.

HALLSVIKEN, an inlet about 5 miles long is entered about 10 miles northward of Landsort. The inlet, 4 to 15 fathoms deep is fringed by reefs. A submarine cable (sec. 5C-3), marked by two pairs of beacons, is laid through the middle of the inlet. The coastal fairway, accommodating vessels with a draft of 22 feet, leads to Hallsviken.

A harbor at the head of the inlet is approached through a fairway entered by vessels with a draft of 20 feet. Vessels with a draft of 12 1/2 feet can berth at a wharf with 13 to 15 feet alongside. Another wharf has 7 1/2 feet alongside.

BOKOSUND, a narrow, navigable passage leading northeastward from the entrance to Hallsviken, joins an approach fairway leading westward from Svarthall (58°52'N., 17°40'E.), to Trosa entrance fairway. Vessels with a draft of 11 3/4 and 5 feet, respectively, are accommodated in the approach and entrance fairways.

TROSA, about 14 miles northward of Landsort, has a harbor basin more than 6 feet deep. Piers in the basin will accommodate vessels with a draft of 5 feet. Fuel oil, provisions and water are available.

MORKO, an island ranging about 10 miles northward, lies in the middle of the inlet leading to Sodertälje. Palsundet, a narrow passage with a least depth of 10 feet, originates about 4 miles northeastward of Trosa and extends northward between Morko and the

mainland, westward. A ferry and bridge cross the sound.

OAXEN (58°58'N., 17°43'E.), an island close eastward of Morko, lies close to the approach fairway to Sodertälje. Submarine cables are laid from southern Morko to the island. Several jetties along the southern part of Oaxen will accommodate vessels with a draft of 19 feet. There are cranes on the jetties. A tug is available.

STORA VIKA, a harbor about 3 miles southeastward of Oaxen, is located on the eastern side of a narrow inlet. Fairways lead northeastward and southeastward from the main fairway to Sodertälje to the Stora Vika approach fairway. Vessels with a draft of 21 1/4 feet can proceed to Stora Vika and berth alongside a 650-foot pier at the Cement Works.

SODERTÄLJE (59°11'N., 17°39'E.)

5C-5 The harbor of Sodertälje lies at the head of an extensive inlet about 28 1/2 miles north-northwestward of Landsort. The harbor is an important link between the Baltic and the Swedish inland waterways.

NAVIGATION.—From a position on the coastal track about 15 miles east-southeastward of Olands Norra Udde (sec. 3D-13), a course of 007° for about 86 miles leads to the Approach Buoy and pilot cruising grounds southward of Landsort.

This track passes over a least depth of about 10 fathoms clear of the shoals northward of the buoy.

ICE.—See section 5B-12. Sodertälje Canal shipping is hindered by ice during January-March.

DEPTHS—DANGERS.—The intricate approach fairway leading to Sodertälje from westward of Landsort is well-marked by lights and buoys according to the Swedish system. Local knowledge is necessary. The numerous dangers adjacent to the fairway are also well-marked and are best seen on Swedish Charts for the area.

The approach fairway from Landsort will accommodate vessels with a draft of about 30 feet to Sodertälje. The fairways through Skanssund, the narrow passage off the northeastern side of Morko, and Brandalssund, about 3 miles northward of Skanssundet, afford the least depths.

The preferred deepwater fairway passes eastward of Galklubb (58°53'N., 17°43'E.).

MINES.—A minefield is laid across the approach fairway between Vastra Roko (58°47'N., 17°47'E.), and the northern extremity of Kolguskar Island, about 1 1/4 miles northward. Vessels passing through the area during a thunderstorm do so at their own risk. Anchorage is Prohibited.

CAUTION.—A ferry crosses Skanssund at the narrows. A submarine cable is laid nearby. A maximum speed of 7 knots is permitted through Skanssund.

HARBOR.—The harbor consists of an Outer Harbor, Sodertalje Canal, and Maren, close southward of the canal lock. The Outer Harbor, in the approaches to the canal, is 26 to 39 feet deep. Fringing shoals, marked by buoys, extend off the southwestern and northeastern sides. Wharves line the western side of the harbor, and piers of a sawmill are in the northeastern side. An oil harbor at the southwestern entrance, about 400 yards northward of a lighthouse, is 34 feet deep. A power cable, about 137 feet high, spans the harbor near the oil piers.

The Sodertalje Canal, connecting the Outer Harbor with Lake Malaren, is about 1 1/2 miles long, 200 feet wide, 20 1/2 feet deep, and admits vessels with a draft of 19 1/2 feet. Cables span and are laid across the canal. A speed of 6 knots is permitted. A lock in the canal is about 446 feet long, 65 1/2 feet wide, and 27 3/4 feet deep. Vessels about 395 feet long and of 60-foot beam enter the lock. Traffic signals are shown at either end of the canal and from the railroad bridge. Special sound signals are in effect for vessels entering and departing the canal. Bascule railroad and road bridges cross the canal.

Maren, about 12 1/2 feet deep, is used by foreign pleasure craft.

Malar, a harbor at the northern end of the canal, is about 15 to 19 feet deep.

AIDS TO NAVIGATION.—Granklubben (58°48'N., 17°45'E.), is an islet about 5 miles northwestward of Landsort. A light is shown from the islet. Lights are shown from Vastra Roko and Kolguskar, islets at the extremity of the minefield. Fifong Island, Sankhallan and Stenskar Islets, marked by lights, lie between the minefield and Marko Island.

Lights are shown from Egelsholm and Northolmen, off the eastern side of Morko, close to the fairway. Regarn Light is shown near the northern end of an island southeastward of Oaxen. A light is shown from Brandalssund and lights in range, 062°, shown from the mainland, lead through the narrows. Lights in range, 313°, are shown from the southern entrance of the canal. A light is shown from Igelsta, in the approach to the Outer Harbor.

5C-6 PILOTS.—There is a pilot station at Landsort (sec. 6A-1) and at Sodertalje. Vessels from seaward obtain pilots about 2 miles southward of Landsort, or close eastward of the lighted whistle buoy, with a radar reflector, moored about 4 miles southward of Landsort, at any time if E.T.A. is given before 1600-hours of the day preceding arrival. Vessels arriving via the coastal fairway obtain pilots from Oxelosund. Vessels outbound or continuing through the canal obtain pilots at the canal lock.

ANCHORAGE.—Anchorage can be taken in the Outer Harbor, in 4 1/2 to 6 1/2 fathoms, clay, also in Lina Inlet, about 2 miles northward of Sodertalje, in 8 1/2 fathoms, gravel over clay. The preferred anchorage lies in 10 fathoms, about 1/2 mile south-southeastward of Igelsta.

DIRECTIONS.—From close eastward of the lighted whistle buoy moored on the pilot cruising grounds, steer 355° for Landsort. When about three-fourths mile from Landsort, change course to 318°, and steer for Granklubben light structure (sec. 5C-5). When abeam of Vastra Roko, change course for Kolguskar light structure passing northwestward of the islet (sec. 5C-5). Steer 316° for the southern extremity of Fifong Island, with Kolguskar Light astern, passing midway between the buoys on either side of the fairway. Thence pass close eastward of Fifong, Sankhallan, Galklubb, Stenskar, Egelsholm, and Northolmen Lights. At night remain in the white sectors of these lights. Steer 062° on the Range Lights through Brandalssund. After clearing the narrows steer a midchannel course passing close westward of Flasklosa and close eastward of Igelsta Lights.

5C-7 SODERTALJE, a city of about 40,000

inhabitants, is located on the canal entrance to Lake Malaren and about 22 miles south-westward of Stockholm. There is a custom-house in the port.

Exports include lumber, grain, cement products, and machinery. Imports include fuels, cement, oils, fertilizer, asphalt and gravel.

BERTHS.—A stone wharf in the Outer Harbor is about 985 feet long with 19 to 26 1/4 feet alongside. Other piers and wharves are less than 200 feet long with 16 1/2 feet alongside. A pier at the sawmill is 360 feet long with 10 to 16 1/2 feet alongside. The oil piers have about 16 to 25 feet alongside the outer pilings. The Outer Harbor is served by the railroad. Several cranes of 2- to 10-tons are on the quays.

Malar Harbor is quayed for about 900 feet with 10 to 19 1/2 feet alongside.

Snackviks Harbor, close northwestward of Malar, has a pier about 260 feet long with 18 feet alongside.

SUPPLIES.—Provisions, bunker oils, water, ships' stores, and charts are available.

REPAIRS.—Minor engine and hull repairs can be made. A shipyard at the southeastern entrance of Lina Inlet (sec. 5C-6), has a marine railway for vessels of 500 d.w.t.

COMMUNICATIONS.—The port is connected with the Swedish railroad system. Shipping is conducted with Stockholm and other Baltic ports. A tug is available.

DERATTING.—See section 1-4.

MEDICAL.—There is a hospital in the city.

VASTERAS (59°37'N., 16°33'E.)

5C-8 Vasteras, the largest inland port of Sweden, is located on the northwestern side of Lake Malaren, about 51 miles from Sodertalje and 60 miles from Stockholm.

NAVIGATION.—See section 5C-5.

ICE.—Although the harbor is kept open by icebreakers normally, ice in the approach canals hinders shipping during January-March.

DEPTHS-DANGERS.—The least depth in the approach fairway is 21 1/4 feet at mean water-level. From Sodertalje Canal the fairway leads about 4 1/2 miles north-northwestward to the southeastern corner of Lake Malaren. Buoys mark the dangers adjacent to the fairway. Numerous cables and pipes

are laid across the fairway. A power cable, with 114 feet vertical clearance, spans the fairway westward from Tegeltorp (59°14'N., 17°36'E.).

Hammarbyleden, leading from Stockholm to Vasteras, is about 20 1/2 feet deep. A lock in the canal is 377 feet long, 57 feet wide, and 23 feet deep.

HARBOR.—The harbor consists of four parts. The Deepwater Harbor, for bulk cargoes, is 21 1/4 feet deep. The Oil Harbor is 17 1/2 to 21 1/4 feet deep, the Old Harbor is 16 1/2 feet deep, and the Power Station Harbor is 21 1/4 feet deep. Quays line the harbors.

AIDS TO NAVIGATION.—Lights and buoys mark the sides, turns, and direction of the fairway to Vasteras. Lights in range, 137° astern, lead from Malar Harbor to Lina Inlet.

PILOTS.—Pilots can be obtained from Sodertalje and Stockholm.

ANCHORAGE.—Anchorage can be taken in 4 to 6 1/2 fathoms off the quays.

DIRECTIONS.—Local knowledge is necessary.

5C-9 VASTERAS, a growing port and city of about 80,000 inhabitants, is located in a mining and industrial area.

Exports include grain, iron ore, lumber, wood and metal products. Imports include fuel and oils, metals, chemicals and iron.

BERTHS.—There are about 1,500 feet of quays at the Deepwater Harbor, with 21 1/4 feet alongside available to vessels with a draft of 19 3/4 feet partly loaded or of 5,000 d.w.t., fully loaded. The Oil Harbor has a quay about 440 feet long with 17 1/2 to 21 1/4 feet alongside. The Old Harbor is lined with about 3,700 feet of quays having 16 1/2 to 21 1/4 feet alongside. At the Power Station Harbor, a quay about 980 feet long has 21 1/4 feet alongside. Most of the quays are served by the railroad. There are numerous cranes with capacities of 1 ton to 50 tons. There is a 125-ton crane at the grain elevators in the Old Harbor, and a 165-ton crane on East Quay.

SUPPLIES.—Provisions, diesel and fuel oils, water on the quays and by waterboat, are available.

REPAIRS.—Minor repairs can be made.

COMMUNICATIONS.—The port is connected with the Swedish railroad system. Shipping is conducted with Baltic and European ports. Ice-breaking tugs are available.

DERATTING.—See section 1-4.

MEDICAL.—There is a hospital in the city.

ANCHORAGES

5C-10 HALLSVIKEN.—Anchorage can be taken in 4 1/2 to 8 fathoms, clay, clear of the submarine cable.

TROSA.—Anchorage can be taken in 2 to 5 fathoms, clay, in a bight about 2 miles south-southeastward of the harbor. Anchorage, available to vessels with a draft of 22 feet, can be taken in several bights northward of Trosa. Local knowledge is necessary.

OAXEN.—Anchorage can be taken in 5 1/2 to 12 fathoms, clay, close southward of Oaxen, clear of the submarine cables.

SODERTALJE.—See section 5C-6.

VASTERAS.—See section 5C-8.

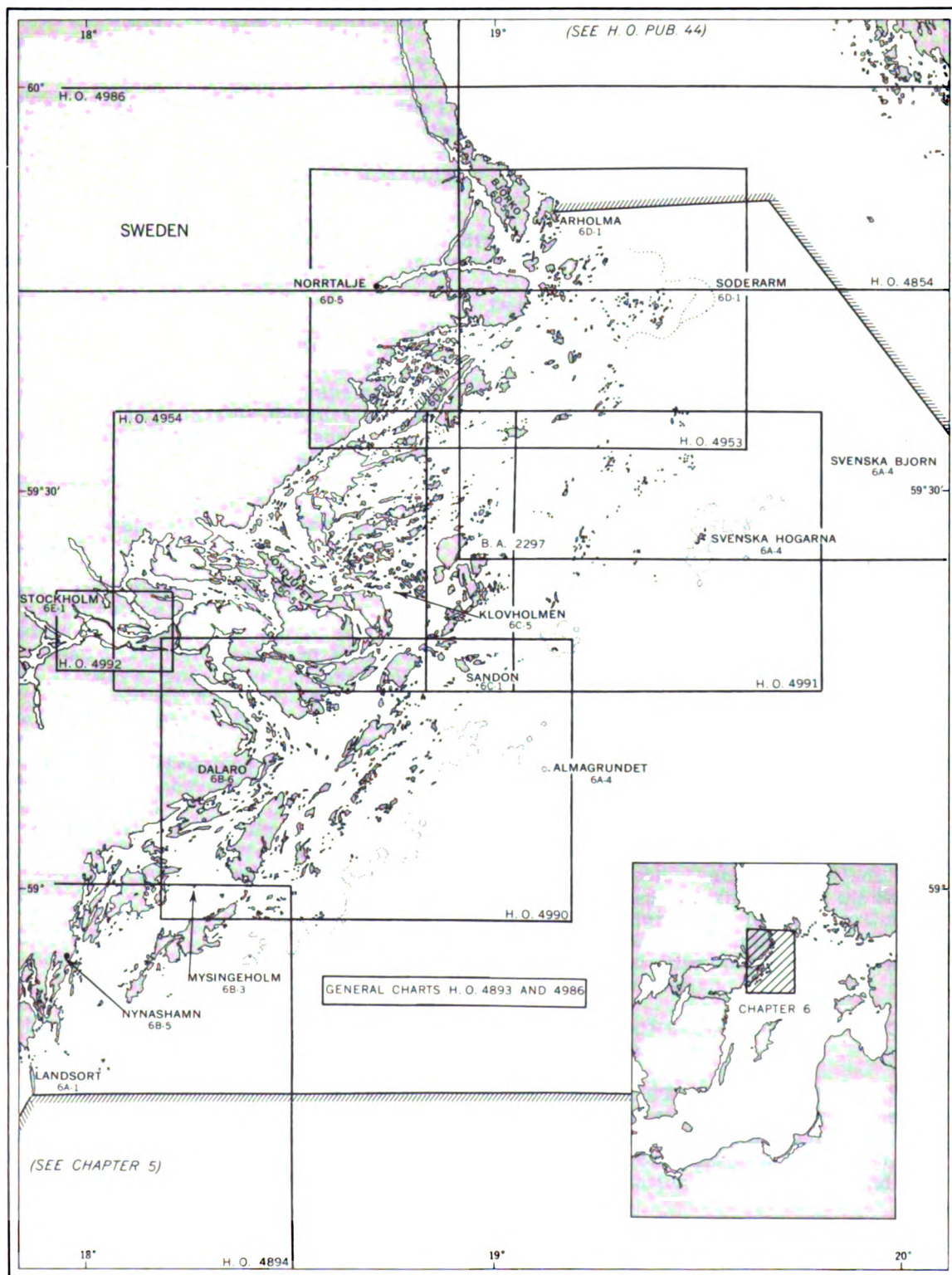


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.

Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 6—GRAPHIC INDEX

CHAPTER 6

LANDSORT TO SIMPNASKLUBB

PART A. Stockholm Skargard—Offlying Dangers.
PART B. Southern Approach to Stockholm.
PART C. Eastern Approach to Stockholm.
PART D. Northern Approach to Stockholm.
PART E. Stockholm

Plan.—This chapter describes the Swedish coast, approaches, and offlying dangers between Landsort and Simpnasklubb. The sequence of description is from south to north.

GENERAL REMARKS

6-1 The irregular, rocky, and wooded coast between Landsort and Bjorko, about 80 miles north-northeastward, is fronted by Stockholm Skargard, an archipelago interspersed by innumerable dangers extending about 30 miles offshore in places. There are few prominent landmarks, although several islands in the southern part of the archipelago are high enough to be identified. Conspicuous light structures mark the seaward side of the Skargard.

Depths in the approaches to the archipelago are very irregular. Soundings are of little help in approaching fairways, as depths close to and within the outer shoals are often greater than a few miles seaward. Numerous branch fairways and inner channels lead between the various dangers, and as much of the archipelago consists of uncharted dangers, a strict adherence to prescribed fairways is advocated. The 20-fathom curve closely contains the majority of dangers lying off this coast.

The major port of Stockholm, and the lesser ports of Nynashamn and Norrtälje, with the main approach and entrance channels are described.

NAVIGATION

6-2 See section 5-2. From Almagrundet, a course of 050° for about 37 miles leads to a position 1 mile eastward of Svenska Björn Lightship. This track passes over a least depth of 8 1/4 fathoms about 8 miles from the lightship.

From Svenska Björn a course of 318° for about 35 miles leads to a position 9 miles northeastward of Simpnasklubb (59°54'N., 19°05'E.). This track leads over a least depth of 9 1/4 fathoms about 7 miles from the lightship.

Detailed navigational information pertaining to port approaches is included in the principal description of the ports.

WINDS—WEATHER

6-3 See section 2-3.

CURRENTS—WATER LEVEL

6-4 See section 2-4. The current from Simpnasklubb usually sets southwesterly through the Skargard, and may attain a velocity of 2 knots. Currents close offshore and in the approach channels through the Skargard are variable. In the outer approaches to this coast there is a westerly set.

Water Level.—The difference in water level is about 3 1/4 feet. Northerly and northeasterly winds raise the level; easterly and southeasterly lower the level. There are exceptions.

ICE

6-5 See section 2-5. With onshore winds, the waters seaward of the Skargard may be encumbered with drift ice.

Special regulations and instructions have been promulgated for shipping in the Stockholm Skargard during the ice season. Consult the Stockholm Harbor Administration, Police Authorities, and Pilot Office for the latest ice-channel information.

PART A. STOCKHOLM SKARGARD—OFFLYING DANGERS

6A-1 LANDSORT (58°44'N., 17°52'E.), is the southern end of Oja Island. The southern approach channel leading through the archipelago to Stockholm passes eastward of Landsort. A pilot station is located on Landsort.

Dangers lying southward of the island are described in section 5C-2.

Lights are shown from a tower on Landsort. A fog signal sounds and a radiobeacon transmits at the tower. Range lights, shown on the eastern and western sides of Landsort, lead into the respective pilot harbors.

COAST—GENERAL

6A-2 The coast and archipelago, between Landsort and Bjorko present few landmarks, especially in the northern part. The outer dangers are marked by a lightship, lighthouses, and buoys, valuable aids in approaching the archipelago. The southern part of this rugged coast is fronted by the prominent, wooded islands of Mallsten, Nattaro, Alo, and Uto. A windmill standing atop a high hill on northwestern Uto (58°58'N., 18°20'E.), can be seen for about 25 miles. A conspicuous monument stands on an islet about 4 miles westward of the windmill. Nattaro has dark shores, while Uto has several high cliffs, light red in color, sloping seaward. The high, wooded, southern summit of Mallsten, lying in the narrows westward of Uto, is prominent.

Approaching the eastern side of the archipelago, the Stavsnaas Radio Towers (59°17'N., 18°43'E.), and a high chimney on Runmaro Island, about 2 1/2 miles southeastward, are conspicuous from afar. Korso Tower, rising about 145 feet above the water, stands 1/2 mile eastward of Sandon Island and is visible about 18 miles.

Arholma Beacon (59°51'N., 19°07'E.), on the western side of Arholma Island, can be seen about 18 miles seaward. The beacon, painted red with a white median band, and the Simpnasklubb Lighthouse, are prominent approaching from northeastward.

PROTECTED AREAS.—All the main channels leading through the archipelago to Stockholm, and much of the intervening coast, lie within protected areas (sec. 1-110), including the area around Vaxholm (sec. 6D-6).

PROHIBITED ANCHORAGES, AREAS, LANDINGS.—Several areas in which anchorage, shipping, and landing is prohibited exist in the skargard. They are described with related features if in proximity to the main channels. All areas are marked by aids or notice boards. Strict adherence to public channels is mandatory.

DEPTHS—DANGERS

6A-3 See section 6-1. Offlying dangers are described in section 6A-4. Much of the outer archipelago contains uncharted dangers and is entered only with local knowledge. Lying between the approach channels leading to Stockholm and the coast are extensive danger areas in which shipping is prohibited. The depths in channels, and the bays through which they lead, are described with the approaches to Stockholm.

GUNFIRING AND TORPEDO RANGES.—An area in which gunfiring practice is conducted extends about 5 miles south-southeastward of Nattaro Island to about 10 miles northeastward of Huvudskar (sec. 6A-4). Another area extends about 8 miles northeastward of Simpnasklubb (sec. 6D-1).

Torpedo firing exercises are conducted in the bay southward of Galon (59°04'N., 18°14'E.), at the entrance of Harsfjarden, a prohibited area close westward. Red flags and lights mark craft deployed in the exercise. The waving of these markers indicates vessels must stop. Buoys aligned mark the range.

SUBMARINE CABLES.—Submarine cables, pipes, and compressed air tubes to prevent ice formation, are laid across the fairways and approach channels. Notice boards and lights mark the numerous cable landings.

MINEFIELDS.—Mines are laid in the seaward entrance of the main approach channels through the archipelago. Details are given with related features. Mariners passing over the minefields during a thunderstorm do so at their own risk.

OFFLYING DANGERS

6A-4 **GUNNARSTENARNA**, a group of rocky islets, lie in deep water between 5 and 6 miles east-northeastward of Landsort. Roken, low rocks, lie about 5 miles eastward of Landsort.

HUVUDSKAR (58°58'N., 18°34'E.), islets about 6 1/2 miles eastward of the northern end of Uto Island, are surrounded by rocks, with detached rocky patches extending to Gunnarstenarna. A light is shown from Huvudskar and from Vindbadan, a rock about 3 miles northeastward.

A chain of low islets and detached rocky shoals extend about 22 miles north-northeast-

ward of Huvudskar. Bulleron, a high bare islet with a prominent tower, lies near the northern end of the chain. Demban, rocky shoals with a least depth of 1 1/4 fathoms, marked eastward by a buoy, lie about 8 1/2 miles northeastward of Huvudskar. Brandsten, rocks awash, marked by a buoy close eastward, lies about 3 miles eastward of Bulleron.

ALMAGRUNDET LIGHT (59°09'N., 19°08'E.), about 21 miles northeastward of Huvudskar marks the easternmost danger near the main approach channel to Stockholm. A fog signal is sounded and a radiobeacon transmits from the lighthouse.

ALMAS GRUND, shoals with a least depth of 3 fathoms, marked by buoys on the southern and western sides, lie between Almagrundet and Brandsten.

SVENSKA HOGARNA (59°27'N., 19°30'E.), a group of low, bare islets surrounded by rocky shoals extending about 4 miles seaward, lie nearly 23 miles offshore. A light is shown and a fog signal is sounded from a lighthouse marking the islets. Beacons, standing close southward of the light, mark the entrance to a harbor of refuge. Kopmansgrund, a 1 1/4-fathom pinnacle rock marked by a buoy, lies about 5 miles northeastward of Svenska Hogarna.

SVENSKA STENARNA, high, light-colored rocks, lie about 9 miles northward of Svenska Hogarna. A red framework beacon, with black and white slats, marks the rocks. Detached patches with a least depth of 1 fathom, marked by buoys at the seaward extremities, extend about 5 and 8 miles northeastward and eastward, respectively, of Svenska Stenarna.

SVENSKA BJORN LIGHTSHIP (59°33'N., 20°03'E.), moored about 17 1/2 miles east-northeastward of Svenska Hogarna Light, marks the outermost extent of dangers eastward of the archipelago. The lightship with two masts is painted red, and has "Svenska Bjorn" in white letters on each side. A fog signal is sounded and a radiobeacon transmits.

ARMBAGEN, a 3 1/2-fathom shoal, marked close southeastward by a lighted whistle buoy with a radar reflector, lies about 5 miles northwestward of the lightship. Troskeln W and Troskeln E are two lighted

whistle buoys, with radar reflectors, marking 4 3/4 and 6 1/2-fathom shoals lying about 3 miles apart and 9 miles northwestward of the lightship.

PART B. SOUTHERN APPROACH TO STOCKHOLM

6B-1 Landsort, at the southern approach to Stockholm, is described in section 6A-1.

COAST—GENERAL

6B-2 The coast between Landsort and Dalaro, about 29 miles north-northeastward, is fronted by dangers extending eastward, with the main channel from the Landsort entrance leading between the dangers and the offlying islands described in section 6A-2.

DEPTHS—DANGERS

6B-3 The southern approach to Stockholm, from eastward of Landsort, leads through several bays and joins the eastern approach channel in Kanholmsfjarden, about 45 miles northeastward of Landsort. The deepwater bays contain numerous dangers marked by lights and buoys according to the Swedish system (1965). Only those dangers near the approach channel are described. Strict adherence to the various light sectors leading through fairways is advisable. The latest applicable charts and light lists should be consulted.

The least depth in the southern approach channel is found in an unmarked 5-fathom patch about 2 1/2 miles northward of Fjardhallan (59°09'N., 18°33'E.), rocky islets from which a light is shown.

Dangers approaching Landsort are described in section 5C-3. Bredgrund, 3 1/2-fathom shoals, marked by a lighted whistle buoy with a radar reflector, lies about one-half mile south-southeastward of Landsort. A 4 1/4-fathom shoal, marked by a buoy, lies about one-half mile northeastward of Bredgrund.

SKRAPAN, an islet in the fairway about 4 1/2 miles northeastward of Landsort, is fringed by 1 1/2-fathom reefs. A light is shown from the islet. Viksten, islets about 1 mile westward of Skrapan, are reef-fringed. Lights are shown from the northwestern and southeastern sides and a beacon stands on the

southern islet. A rock, awash, marked by a beacon, lies about one-fourth mile westward of the northern islet.

MALLSTEN (58°51'N., 18°02'E.), an island about 4 1/4 miles northeastward of Viksten, lies in the entrance of Dalaro Channel. Detached patches with a least depth of 2 fathoms, marked by buoys, lie near the approach channel southward of Mallsten. Masknub Light is shown from an islet close to the fairway about one-half mile off the northwestern side of Mallsten. A fog signal is sounded near the light structure.

MINEFIELD.—A mined area, in which anchoring is prohibited, extends across the southern approach to Stockholm between the eastern extremity of Gunnarstenarna (sec. 6A-4), Skrapan, and the islands lying about 2 miles northeastward and northwestward of Masknub Light.

OSTRA ROKO is an islet about 4 miles north-northeastward of Mallsten. A light is shown from the islet. Two-fathom patches lie close southward. Patches of 1 1/2- and 3-fathoms, marked by buoys, lie near the fairway, north-northeastward of Ostra Roko.

MYSINGEHOLM (59°00'N., 18°16'E.,) and Soderhall are islets about three-fourths mile apart, lying close to the fairway. Lights are shown from the islets. Anchorage is prohibited westward of Soderhall. Shoals of less than 1 fathom, marked by buoys, lie near Soderhall and the fairway southward of Mysingeoholm.

LILLA ROTHOLMEN, an islet about 5 miles from Mysingeoholm, lies in the narrow fairway between Galon and Orno Islands. A light is shown from the islet. Shoals of less than 3 fathoms, marked by a buoy, lie near the fairway southward of the islet. Numerous dangers, best seen on the chart, lie between the islet and Dalaro, about 5 miles distant. Buoys mark the dangers near the fairways. Aspo, Stenholm, and Genbote are islands lying in the narrows southward of Dalaro. Lights are shown from the islands.

PILTHOLM, an island in the fairway about 1 mile eastward of Dalaro is surrounded by shoals with a least depth of 4 1/4 fathoms. A stone beacon stands on the southern end of Piltholm and a buoy marks the eastern extremity of the shoals. A beacon, painted yellow and red, with a radar reflector,

stands on Piltholmsknall, a rock about one-half mile northeastward of Piltholm.

KOFOTSGRUND (59°13'N., 18°37'E.), is a patch in the fairway about 8 miles northeastward of Dalaro. A light is shown marking the patch. Several patches of less than 1 1/2-fathoms, marked by buoys, lie close to the fairway between Kofotsgrund and Fjardhallan, about 4 1/4 miles south-southwestward.

LANGHOLMEN, an island about 7 miles northeastward of Kofotsgrund, is the last danger in the southern approach to Stockholm. A light is shown from the western end of the island. A group of islets lie close westward of the light structure. Kafoten and Franska Stenarna are lights shown from charted dangers between Kofotsgrund and Langholmen.

NAVIGATION

6B-4 See section 5C-5.

COASTAL FEATURES—LANDMARKS

6B-5 The coast adjacent to the southern approach to Stockholm is rocky and irregular. Between Landsort and Nynashamn, about 10 1/2 miles northward, the coast is formed by several, narrow peninsulas extending southward and fringed by numerous dangers. Garflotta and Bedaron (58°54'N., 17°58'E.), are islands lying close offshore. The latter island, southeastward of Nynashamn, is fronted by islets and patches closing within 1 mile of the approach fairway. The coastal fairway from Oxelosund (sec. 5B-12) joins the approach fairway close northward of Viksten (sec. 6B-3).

HERRHAMRA is a harbor of refuge located between the islands about 3 miles northward of Landsort. Kroskar (58°47'N., 17°51'E.), a red and white cairn beacon about 20 feet high, stands nearby. Narrow buoyed fairways, available to vessels with a draft of 14 3/4 feet, lead eastward and westward of Landsort to the harbor and anchorage. A pier at the head of the harbor has 6 1/2 feet alongside. Anchorage can be taken in 5 1/2 to 6 1/2 fathoms, clay, about 200 yards northward of Kroskar beacon. A pilot can be obtained from Landsort.

NYNASHAMN (58°54'N., 17°58'E.), is an ice-free industrial harbor on the coast about 27

miles southward of Stockholm and about 10 miles north-northeastward of Landsort. The harbor, lying between Bedaron (sec. 6B-5) and the mainland, is about 30 to 90 feet deep and has several patches of less than 4 1/2 fathoms. Buoys and beacons mark the dangers. The harbor has about 1,300 feet of quays, with rail connections and cranes, at which vessels with a draft of 28 feet are accommodated. An Oil Harbor, about 1 mile northeastward has two wharves about 800 feet long with 42 feet alongside. Tankers of 60,000 d.w.t., with a draft of 40 feet, can berth in daylight.

Deepwater fairways (51 feet) lead from southeastward of Mallsten (6B-3) and northward of Bedaron to the Oil Harbor. Vessels with a draft of 39 1/2 feet enter the southern approach fairway eastward of Landsort and Bedaron. Vessels with a draft of 13 feet enter a southern fairway leading close northward of Viksten (sec. 6B-3) and westward of Bedaron.

CAUTION.—The fairway leading to the Oil Harbor is closed to shipping when tankers are alongside. Mooring lines stretched across the fairway eastward block the passage. Lighted floats and notice boards give warning.

Maximum speeds of 5- and 7-knots are allowed in the harbor and channel westward of Bedaron, respectively.

Range lights on Bedaron and an island close westward lead through the southern fairway. Lights are shown from Nynashamn Quay, and on dangers within one-half mile eastward of the Oil Harbor.

Anchorage can be taken in 5- to 16-fathoms between Nynashamn and Bedaron and in 4 fathoms off the piers.

Pilots at Landsort (sec. 6A-1) can be obtained southward of the pilot station (sec. 5C-6) on 12 hours notice. There is a radio-telephone.

Supplies of provisions, fuel and diesel oils, and water are available. Tugs are obtainable. Minor repairs can be made.

6B-6 BETWEEN NYNASHAMN AND DALARO, about 19 miles northeastward, the irregular coast is fronted by Musko Island and Galon (sec. 6A-3), fringed by dangers extending within one-half mile of the southern approach fairway to Stockholm. A Prohibited Area, closed to shipping, encloses most of

the coastal waters along this coast including the western side of Orno Island, opposite Galon. Anchorage is prohibited between Dalaro and Orno, and between southern Galon and southwestern Orno (59°02'N., 18°20'E.). A Minefield extends about 5 miles south-southeastward of this position. Anchorage is prohibited near ferry lanes, submerged cable and pipelines, fairways, and in the narrow reaches leading to Stockholm.

DALARO (59°08'N., 18°25'E.), the easternmost part of the coast extending from Nynashamn, is located across the narrows about 1 3/4 miles northwestward of Orno. A canal about 5 feet deep, spanned by bridges, separates Dalaro from the mainland. A village and Pilot Station are situated on the southwestern side of Dalaro. The southern approach channel and branch fairways lead between several islands and shoals, marked by lights and buoys, in the narrows southward of Dalaro.

The Coast extending northwestward from Dalaro to Stockholm is fronted by islands between which lead the southern approach fairway and branch fairways to Stockholm.

SALTSJOBADEN, a port about 10 miles northwestward of Dalaro, has a harbor about 5 to 16 1/2 feet deep. The main approach leads through an inlet northwestward of Storra Husarn (59°10'N., 18°34'E.), to an anchorage close east-southeastward of town. Vessels with a draft of 25 feet are accommodated in the fairway. A pier in the harbor is about 330 feet long with 5 to 16 1/2 feet alongside. There are several small piers with 6 1/2 to 13 feet alongside. The anchorage is 6 to 19 fathoms deep, clay. Fuel oil, provisions, and water are available.

GUSTAVSBERG, (59°19'N., 18°23'E.), a port at the head of an inlet about 4 miles northeastward of Saltsjobaden, has an industrial harbor with a pier about 820 feet long with 11 1/2 to 19 3/4 feet alongside. Vessels with a draft of 16 1/2 feet can enter the fairway leading to the pier and berth alongside. Anchorage can be taken in 5 1/2 to 14 fathoms, clay, outside the harbor. Fuel oil and provisions are available.

RUNMARO, is an island about 13 miles northeastward of Dalaro and one-half mile southward of Langholmen (sec. 6B-3). The junction of the southern and eastern approach

channels to Stockholm lies about 2 miles northeastward of Langholmen.

SUBMARINE CABLES.—Numerous submarine cables, indicated on the charts, are laid across the southern approaches to Stockholm. The landings are marked by notice boards and in some places by range lights.

6B-7 CHANNELS.—The distance between Landsort and Stockholm via the southern approach channel is about 77 miles. Dalaro Channel, a continuation of Landsort Channel, is entered about 8 1/2 miles northeastward of Landsort. Several 8-fathom patches lie in the fairway. Vessels with a draft of 39 1/2 feet can enter the channel eastward of Landsort, pass westward of the 4 1/4-fathom shoal, eastward of Viksten, and close westward of Masknöv Light, all described in section 6B-3. At night, a draft of 33-feet is permitted. The western branch of the approach fairway, passing westward of Viksten, is available to vessels with a draft of 19 1/2 feet. From Masknöv the approach fairway leads close westward of Ostra Roko, thence, if northbound, between Mysingeöholm and Söderhall to a position close eastward of Lilla Rotholmen.

From Lilla Rotholmen the approach fairway leads close westward of Vattskar Islet, through the channel eastward of Aspö Island, northwestward of Genbötö and Piltholmsknäll, to Fjärdhallan.

Southbound vessels depart the main fairway close eastward of Kycklingen Light (59° 06'N., 18° 23'E.), pass eastward of Galön Island and rejoin the fairway about 1 mile northeastward of Söderhall. A maximum speed of 7 knots is permitted in the channel approaching Dalaro.

The main southern approach fairway leads northward of Fjärdhallan, close eastward of Stora Husarn, Kofoten, close westward of Franska Stenarna, to Langholmen. From close westward of Langholmen Light the fairway, available to ships with a draft of 23 feet, leads about two miles northeastward to a junction with the eastern approach fairway to Stockholm.

Several branch fairways, for vessels of less draft, depart the southern approach fairway between Landsort and the eastern approach fairway. Exceptions include branches,

for vessels with a draft of 39 feet, leading eastward of Runö (59° 18'N., 18° 43'E.), and Danziger Gatt, leading eastward of Mallsten (sec. 6B-3). The former is usually entered by southbound vessels. The seaward approach through Danziger Gatt has a least depth of 33 feet in the fairway opposite the northern end of Mallsten. A draft of 33-feet is permitted.

Ice Channels.—Icebreakers keep the main southern approach fairway open during the ice season. The southbound fairway leading close eastward of Galön and Göderhall, southward of Piltholm and Fjärdhallan is an ice channel in which vessels cannot meet and a speed exceeding 5 knots is not permitted. The channel between the islands southwestward of Aspö, and Dalaro, is closed to shipping.

PILOTS.—See section 5C-6. The pilot from Landsort conducts the ship to Dalaro. A pilot from the station in town boards ship in the channel off Dalaro and conducts the ship at any time to Stockholm.

ANCHORAGES

6B-8 LANDSORT.—Anchorage can be taken in 6 to 16 fathoms within 1 mile northeastward of Landsort.

ALVSNABBEN.—Anchorage, sheltered but narrow, can be taken in 1 1/2 to 8 3/4 fathoms, clay, in the sound southward of Alvsnabben (58° 59'N., 18° 10'E.).

OSTRA ROKO.—Anchorage can be taken in 8 to 22 fathoms within 1 mile northeastward of Ostra Roko.

MYSINGEHOLM.—Anchorage can be taken in 6 1/2 to 16 1/2 fathoms, clay, close northeastward of Mysingeöholm, and in 11 to 16 1/2 fathoms, clay, between Stora Rotholmen and Galön.

DALARO.—Anchorage can be taken in 10 fathoms, clay, in the bay off the southwestern end of Dalaro.

PART C. EASTERN APPROACH TO STOCKHOLM

6C-1 Sandön (59° 17'N., 18° 56'E.), is the largest island of a group lying at the entrance of the eastern approach to Stockholm. Channels lead eastward and westward of the island. Sandhamn, a summer resort at the northeast-

ern side of Sandon, is the location of a pilot station.

A light is shown from Sandhamn. A custom-house stands nearby and the Royal Swedish Yacht Club close southeastward. Submarine cables are laid from Sandon to adjacent islands.

SANDHAMN, the resort harbor, at least 33 feet deep, is approached through southeastern and northwestern channels, 27 and 23 feet deep, respectively. Several piers in the harbor have 6 to 14 1/2 feet alongside. Lights are shown from the piers. Anchorage can be taken in 8 to 16 fathoms, sand and clay, in the harbor with a sternfast mooring to shore. Foreign pleasure craft can anchor here and nearby during the summer months.

COAST—GENERAL

6C-2 See section 6A-2.

DEPTHS—DANGERS

6C-3 See sections 6-1, 6A-3, 6A-4. The eastern approach to Stockholm lies through bays and narrow sounds fringed by numerous dangers. Lights and buoys mark the various dangers according to the Swedish system. Those dangers adjacent to the main approach fairway and channel are described with related features. Foreign vessels must adhere to the main approach through this protected area (sec. 6A-2).

The least depths in the eastern approach fairway are 39 1/2 and 42 1/2 feet, existing about one-half mile southward and south-southwestward, respectively, of the southern end of Sandon.

Numerous dangers lie in the seaward approach to Sandon. Sodergrundan, awash, and marked 800 yards southward by a lighted whistle buoy with a radar reflector, lies about 4 miles southeastward of Sandon. Revengegrundet, a 3 1/4-fathom shoal, lies about 3 miles southeastward of Sandon. A light, with a radar reflector, is shown and a fog signal sounds from a tower on the shoal. Sandhamns Stangskar (59°17'N., 19°00'E.), lies about 2 miles eastward of Sandon. A light is shown from the islet. Gronskar tower stands on an islet about one-half mile eastward. Svangen lighted buoy, with a radar reflector, is moored close northward of a 4-fathom patch lying about 1 mile southwestward of Sand-

hamns Stangskar. Nittonfotsgrund, a 3-fathom patch, marked by a buoy with a radar reflector, lies less than one-half mile farther southwestward.

Osterskar and Adkubben are rocky islets lying about 1 mile southward and southwestward of Sandon, respectively. Lights are shown from the islets. A 3-fathom patch, marked by a buoy, lies about one-fourth mile off the southern end of Sandon and close northward of the fairway. Adan lighted buoy, moored close southward of the fairway, marks a 3-fathom patch northeastward of Adkubben.

MINEFIELD.—A mined area, in which anchoring is prohibited, extends from the southwestern and northwestern ends of Sandon to a group of rocky islets about one-half mile northwestward, thence to Farfarsgrund (59°18'N., 18°53'E.), from which a light is shown. The fairway through the minefield leads between dangers marked by beacons and buoys and the western side of Sandon. Vessels entering the fairway during a thunderstorm do so at their own risk.

Lights are shown from the numerous islands and islets lying adjacent to the eastern approach channel between Sandon and Stockholm. Several 1 1/2- and 2 1/2-fathom patches, marked by buoys, lie close to the channel.

NAVIGATION

6C-4 See section 5-2. From Almagrundet (sec. 6A-4), steer 329 1/2° for Sandhamns Stangskar (sec. 6C-3), and the pilot cruising grounds about 5 miles northwestward of Almagrundet. The course leads over a least depth of 11 fathoms.

COASTAL FEATURES—LANDMARKS

6C-5 The intricate eastern approach to Stockholm leads generally northwestward and southwestward through bays and sounds cluttered by innumerable dangers. The larger islands lying between Sandon and Stockholm include Vindo, Varmdolandet, Ormingelandet, and Lidingon. Numerous smaller islands, and islets showing lights, lie near the main and branch fairways leading to Stockholm. Only the main approach is described. The branches are closed to foreign shipping. Prohibited areas lie adjacent to some branch fairways.

Landmarks approaching Sandon Island

include Brandsten, barren islets appearing as brown hills about 3 miles southward of Sandon. The customhouse and yacht club (sec. 6C-1) are prominent. Korso Tower (sec. 6A-2), and a tower on Lokholm, an islet 1/2 mile northeastward of Sandhamn, are conspicuous features.

Telegrafholm, an islet close northeastward of Sandhamn, and Krokso, an islet adjoining Korso to the northward, are important as anchorage areas. Gastholmsgrund (59°19'N., 18°49'E.), rocks about 3 1/2 miles northwestward of Sandhamn, with an islet about 1/4 mile southward, lie at the southeastern entrance of a deepwater bay. Lights are shown from these dangers, the former with a radar reflector. The eastern approach fairway leads between the dangers.

Klovholmen (59°22'N., 18°45'E.), is an islet on the northwestern side of the deepwater bay. A light is shown from Klovholmen and from an islet about 1/4 mile southwestward. A 2 1/2-fathom patch, marked by a buoy, lies close to the fairway westward of Klovholmen.

Kalvo, an islet about 4 1/4 miles westward of Klovholmen, lies on the northern side of the approach channel. A light is shown from the islet. A 2 1/2-fathom patch lies about 1/4 mile westward of the light and close northward of the channel.

Nyvarp (59°24'N., 18°32'E.), is a point on the northeastern extremity of Varmdolandet, about 1/4 mile westward of the channel. A light is shown on Nyvarp. A 1 3/4-fathom patch, marked by a buoy, lies close to the fairway about 1 1/4 miles southeastward of Nyvarp.

Vastra Saxarfjarden, a bay cluttered by dangers lies northward of Varmdolandet Island. The fairway from Nyvarp leads through the bay, about 1 mile northward of the island, to Tralhavet.

Brodstycket, a shoal from which a light is shown, lies close eastward of the channel at the southeastern side of Tralhavet (59°26'N., 18°23'E.). Lindalssundet, a sound used by outbound vessels only, leads from Brodstycket, eastward to Nyvarp.

Oxdjupet (59°24'N., 18°27'E.), is a point at the narrows between Varmdolandet and Rindo, an island close westward. The northwestern part of Varmdolandet and Rindo are

protected areas. The approach channel leads through the narrows and southeastward of Tynningo, an island about 2 miles southward of Rindo. Foreign vessels must pass through the northern part of the bay lying westward of Tynningo. A light is shown from the western end of Vastra Granholm (59°23'N., 18°18'E.), an islet at the northwestern side of the bay. The main approach channel from Tynningo leads northward of Vastra Granholm.

Lidingon, an island fronting Stockholm, is reef-fringed and encircled by navigable passages. From Vastra Granholm, a channel leads westward to Stora Vartan and the mainland northward of Stockholm. A prohibited area lies in the northern part of Stora Vartan. Halvakssundet is the passage eastward of Lidingon through which the eastern approach fairway leads from Vastra Granholm to Stockholm. Lilla Vartan is the passage between Lidingon and Stockholm. Fjaderholmarna, islets lying at the junction of Lilla Vartan and Halvakssundet, and the shoals extending northeastward, are a prohibited area. Lights and lighted buoys mark the islets and extent of the shoals.

SUBMARINE CABLES.—Numerous cables and pipes, indicated on the chart, are laid across the main and branch channels leading to Stockholm. The cable landings are marked. Anchorage is prohibited in approach channels and passages leading to Stockholm.

6C-6 CHANNELS.—The eastern approach channel between Sandhamn and Stockholm is about 36 miles long. The seaward approach to Sandon is about 5 miles. The main channel, leading southward and close westward of Sandon, is entered by vessels with a maximum draft of 36 feet. At night, a draft of 33 feet is allowed. The sound between Sandon and the islets close eastward is available to vessels with a draft of 16 1/2 feet. As the channel through the sound is only 90 feet wide in the narrows, passage is not recommended. Vessels with a draft of 28 feet are accommodated in a channel leading eastward of Korso (sec. 6A-2), and northward of Bjorko (59°18'N., 18°57'E.). These three channels converge west-northwestward of Sandhamn to form the main fairway, available to ships with a draft of 36 feet, leading toward

Gastholmsgrund and Klovholmen (sec.6C-5). The channels to Stockholm are marked by beacons and buoys according to the Swedish Buoyage System.

Rodloga Channel, available to ships with a draft of 29 1/2 feet, leads from Gastholmsgrund, northeastward for about 28 miles to the sea. The fairway, marked by lights and buoys, is exposed to the weather.

The main approach channel from Sandhamn joins the fairway leading eastward of Runo (sec.6B-7), about 1 1/4 miles westward of Klovholmen. Vessels with a maximum draft of 39 feet can reach Stockholm through the fairway leading close southward of Kalvo, eastward of Nyvarp, and westward of Oxdjupet (sec.6C-5). A draft of 33 feet is permitted at night.

A public branch fairway, available to ships with a draft of 29 1/2 feet, leads from Nyvarp northward to the northern approach channel to Stockholm. This fairway is closed when thick ice forms. Swedish vessels, outbound from Stockholm, can depart the main channel eastward of Lidington and pass close northward of Ormingelandet Island. Lindalsundet (sec.6C-5), is available to ships with a draft of 26 1/2 feet.

SPEED REGULATIONS.—A maximum speed of 5 knots is permitted in Sandhamn Sound. In the channel at Oxdjupet, westward of Tynningo, and northward of the Fjaderholmarna, 7 knots is allowed. A speed of 9 knots is permitted near Vastra Granholm. Notice boards ashore indicate the speeds allowed in the various areas.

ICE CHANNELS.—Icebreakers keep the main eastern approach channel open during the ice season. Many of the branch fairways are closed by ice. Ice information is issued by the Harbor Authority including a regulation entitled, "Advice and Instructions to Mariners concerning Navigation in Fairways containing Ice".

PILOTS.—There is a pilot station at Sandhamn equipped with radar and radiotelephone. A lookout is maintained on Korso. A pilot can be obtained at any time in the approach fairway about 2 miles southeastward of Revengegrundet Lighthouse. Pilots are exchanged westward of Sandon.

ANCHORAGES

6C-7 SANDON.—Anchorage can be taken in 13 to 16 fathoms, sand and clay, and in about 20 fathoms, southwestward and northward of Sandon, respectively. The latter anchorage lies between Telegrafholm and an islet close northward. Anchorage for small vessels can be taken in 8 to 11 fathoms, clay, between Korso and Krokso.

TRALHAVET.—Anchorage can be taken in 8 to 9 fathoms, clay, about 1 mile westward of Brodstycket Light, and in 5 fathoms, 1/2 mile farther westward.

PART D. NORTHERN APPROACH TO STOCKHOLM

6D-1 Stockholm is approached from the northward through two entrances at Soderarm and Arholma, about 10 miles apart. Simpnasklubb Light (59°54'N., 19°05'E.), is shown from a rock about 2 1/2 miles northwestward of the northern extremity of Arholma. A radiobeacon transmits and a fog signal is sounded at the light tower.

Soderarm Light (59°45'N., 19°25'E.), about 19 miles northward of Svenska Hogarna (sec.6A-4), is shown from a tower marking the northernmost of a group of bare islets. Storm signals are shown.

Arholma, an island lying in the northern entrance, is fronted by dangers, many uncharted, extending southeastward to Soderarm. The southwestern side of Arholma lies about 1/4 mile eastward of Bjorko Island (sec.6D-5). A prominent beacon (sec. 6A-2), stands on Arholma.

COAST—GENERAL

6D-2 The coast extends about 10 miles southward of Simpnasklubb to Granhamnsfjarden (59°43'N., 19°07'E.), a bay wherein several fairways meet. From a broad peninsula westward of the bay, the coast, extending southwestward to Stockholm, is irregular and fronted by numerous dangers to Staboudde (59°34'N., 18°38'E.). From this point the coast is quite regular in outline to Tralhavet, about 10 miles southwestward, where the archipelago leading to Stockholm is encountered. There are few major inlets except those

separating the northern islands of Arholma, Bjorko, and Vato. Norrtäljeviken, leading to the port of Norrtälje, indents the coast southward of Vato (sec. 6D-5).

The northern approaches to Stockholm lie within a protected area (sec. 1-110), lying between Simpnasklubb and Storgrund, a 2 1/2-fathom shoal, marked by a buoy, about 5 1/2 miles southeastward of Soderarm. The area extends about 10 miles westward of Soderarm.

DEPTHS—DANGERS

6D-3 The northern approach channels to Stockholm are at least 39 feet deep, but several 1 1/2- to 4-fathom patches, marked by buoys, lie adjacent to the fairways. There are 6 1/2-fathom patches in the channel westward of Ido Island and patches of less than 3-fathoms about 2 miles northeastward of Furusund (59°40'N., 18°56'E.). Granhamn-sfjarden has a 5 1/2-fathom patch in the fairway. Vessels with a draft of 33 feet are accommodated in the fairways.

The seaward approach to Soderarm and Arholma lead in deep water to the entrances where the archipelago is encountered. The outer dangers lie close within the 20-fathom curve. Islets and shoals extending about 3 1/2 miles southward of Soderarm are marked by beacons on the southern and western sides. The beacons serve as ranges for the winter approach fairway. Buoys mark 4-fathom and 1 1/4-fathom shoals about 1 1/2 miles and 1 mile eastward and northwestward of Soderarm. Tjarven (59°48'N., 19°22'E.), an islet on the eastern side of a 3 1/4-fathom shoal, lies about 2 1/2 miles north-northwestward of Soderarm. A light is shown and a fog signal is sounded from the islet.

Hogskar, an islet from which a light is shown, lies in the entrance channel about 1 mile northwestward of the northern end of Arholma. A stone beacon, with a red band, stands on an islet close southward of the light. A foul area between Hogskar and Simpnasklubb, about 1 1/2 miles distant, extends to the channel where it is marked by buoys. A shoal area, cluttered by islets extends about 1 mile eastward of Hogskar and about 3 miles southward of Arholma, terminating at Ido Island. The area between

Ido and Soderarm is filled with dangers, many uncharted. The channel from Soderarm leads between these dangers. Lights and buoys, according to the Swedish system, mark the navigational hazards adjacent to the channel.

SUBMARINE CABLES.—Numerous cables and pipes, best seen on the charts, are laid from the mainland across fairways and between the various dangers. Cables, laid in the northern approaches, extend eastward to Finland. Notice boards and lights mark the landings. Compressed air tubes, to prevent ice formation, are laid in some fairways.

MINEFIELDS.—A mined area, in which anchoring is prohibited, extends across the entrance about 1 mile northward of Ostra Lerskaret (59°44'N., 19°15'E.), to Botveskar, about 2 miles westward of the islet. Lights, shown from the islets, mark the eastern and western ends of the minefield.

A minefield, about 1 mile long, extends across the channel between Bjorko (sec. 6D-5), and the southwestern side of Arholma.

NAVIGATION

6D-4 See section 6-2. From a position on the coastal track about 7 miles northeastward of Soderarm Lighthouse (sec. 6D-1), steer 243° on the entrance range for about 8 miles to the fairway northwestward of Soderarm.

From about 9 miles northeastward of Simpnasklubb (sec. 6D-1), steer 230° for about 5 1/2 miles toward Hogskar light structure (sec. 6D-3), and the pilot cruising grounds.

Approaching Simpnasklubb from the northward, steer 165° on the entrance range.

COASTAL FEATURES—LANDMARKS

6D-5 Between the eastern approach to Stockholm and Simpnasklubb the partly wooded coast presents few features of interest. The archipelago is more open with some wooded islets. The landmarks nearing the entrances are the various lights near the approach channels.

From the broad peninsula (sec. 6D-2), the coastal archipelago extends about 12 miles eastward to Soderarm and 8 miles northward to Simpnasklubb. Tjocko and Tyfo are islands lying about 1/2 mile eastward and 1 1/2 miles northeastward of the peninsula, re-

spectively. Lights are shown from the northwestern points of the islands. Fejan, an island lying close southeastward of Tjocko, has a sheltered harbor in which there are two piers with a least depth of 12 feet alongside. A fairway, southeastward, leads to an anchorage off the harbor in 9 to 12 fathoms, clay and stones.

Vastra Tviklova (59°45'N., 19°19'E.), an islet close southward of the approach fairway, lies about 3 miles westward of Soderarm. A light is shown from the islet. Remmargrund lighted whistle buoy, with a radar reflector, marks a 4 1/4-fathom patch in the fairway northward of the islet.

Bjorko, about 3 miles northward of the peninsula (sec. 6D-2), lies contiguous to the coast and forms the western side of the Arholma approach. Lights, shown from salient points along the eastern side of Bjorko, include Naskubben, about 1 mile southward of Simpnasklubb. Vaddo Kasberg, an isolated hill about 8 1/2 miles northwestward of Simpnasklubb, is conspicuous from seaward. Vato, an island close southwestward of Bjorko, is encircled by navigable inlets including Norrtaljeviken (sec. 6D-2), about 10 miles long.

NORRTALLJE (59°46'N., 18°43'E.), at the head of the inlet, is approached from a bay lying close northward of Tjocko (sec. 6D-5). The fairway leading through Norrtaljeviken, at least 36 feet deep, is marked by range lights and buoys. Lights are shown from dangers adjacent to the channel. Range lights, 259°, lead into the harbor, about 5 to 19 1/2 feet deep. Quays, about 1,200 feet long, line the northern side of the harbor. Vessels with a draft of 18 feet can berth alongside some quays 19 1/2 feet deep. Anchorage can be taken in 2 1/2- to 3 1/4-fathoms, clay, off the harbor entrance. Fuel oil, provisions, and potable water are available on the quays. Minor repairs are made. Ferries ply between the port and Finland.

Kapellskar (59°43'N., 19°05'E.), an islet close southeastward of the peninsula (sec. 6D-2), lies at the entrance to the Furusund Channel. Maro, an islet about 1 mile south-southwestward, lies at the southern side of the entrance. Lights are shown from the islets. A stone beacon with mast and triangular topmark, painted red, stands on Kapellskar.

FURUSUND (59°40'N., 18°56'E.), about 5 1/2 miles southwestward of Kapellskar, is a summer resort on an island forming the northwestern side of the channel at the narrows. Vessels with a draft of 7 1/2 feet can berth alongside a pier 7 1/2 to 9 feet deep. Another pier has 5 to 9 feet alongside.

KOPMANHOLM is the northern end of Yxlan, an island extending along the southern side of Furusund Channel for 8 1/2 miles. Furusund light is shown from Kopmanholm, about 1/4 mile southward of Furusund. A pier near the light has 13 to 16 1/2 feet alongside. A ferry crosses the channel northeastward of the light. Cables, pipelines, and compressed air tubes are laid in the vicinity of the ferry crossing. Blido, an island parallel to Yxlan, is separated by a navigable sound.

HOGMARSO, a sheltered harbor about 2 3/4 miles west-southwestward of Furusund, can accommodate vessels with a draft of 19 1/2 feet in the fairway and 8 to 14 1/2 feet alongside the quays. A shipyard and marine railway with a lifting capacity of 400 tons is located in the harbor.

Ljustero, two islands lying southward of Staboudde (sec. 6D-2), form the eastern side of Furusund Channel. A ferry crosses the channel at Ljustero. Lights mark islets and dangers adjacent to the channel, including Vaxlet, about 3 1/2 miles northeastward, and Nykvarnsgrund, about 5 1/4 miles southwestward of Staboudde.

6D-6 BETWEEN LJUSTEROHUVUD (59°30'N., 18°31'E.) AND VALLERSVIK, about 1 1/2 miles westward, the coast becomes irregular to Stockholm and is fronted by numerous islands between which the northern and eastern fairways lead into Tralhavet (sec. 6C-5). Lights are shown off the southeastern sides of Mjolko and Algo, islands about 3 miles southwestward of Vallersvik.

VAXHOLM, an island about 7 miles southwestward of Ljusterohuvud, has a harbor about 7 to 25 1/2 feet deep. A fairway leading to the harbor can accommodate vessels with a draft of 19 1/2 feet, and about 12 1/2 feet at the piers. A fairway leading to Stockholm passes eastward of Vaxholm. Vessels with a draft of 11 feet can enter the fairway. A speed of 7 knots is permitted. A ferry runs

between Vaxholm and Rindo (sec. 6C-5). Anchorage is prohibited between Vaxholm and Rindo. Provisions, water, fuel oil, and tugs are available.

STORA HOGGARN, an islet about 3 miles southwestward of Vaxholm and eastward of Lidington (sec. 6C-5), has oil installations. Tankers, secured to mooring buoys and ashore, anchor alongside a jetty in 39 1/2 feet. Other jetties have 14 feet alongside.

DJURSHOLM, at the head of Askrikefjarden, a passage leading westward from Vastra Granholm (sec. 6C-5), has piers in the harbor and 3/4 mile southward with 6 1/2 to 16 1/2 feet alongside. Vessels with a draft of 33 feet can enter Askrikefjarden.

6D-7 CHANNELS.—The northern approach channel from Soderarm or Arnholma to Stockholm is about 55 miles long. Vessels with a draft of 33 feet can reach Stockholm from seaward by entering the archipelago at Soderarm, Arholma, or Simpnasklubb (sec. 6D-1).

The entrance channel, from about 1 1/2 miles northward of Soderarm, leads west-southwestward to Granhamnsfjarden (sec. 6D-2), passing between Ostra Lerskaret and Botveskar (sec. 6D-3). A Winter Fairway (sec. 6D-3), accommodates ships with a draft of 23 feet.

The entrance channels, leading close westward of Simpnasklubb (sec. 6D-1), and close northward of Hogskar (sec. 6D-3), join southward of Hogskar. The fairway then leads southward, passing close westward of Tyfo and Tjocko Lights (sec. 6D-5), where it joins the Soderarm fairway at Kapellskar (sec. 6D-5).

The Furusund Channel, extending southwestward between Kapellskar and Tralhavet (sec. 6C-5), is entered by ships with a draft of 29 1/2 feet. A speed of 7 knots is permitted in the channel. The main fairway passes close southward of Vaxlet Sodra (sec. 6D-5) and Staboudde (sec. 6D-2). A branch fairway, available to vessels with a draft of 12 feet, leads northward of Vaxlet Norra. A fairway through the sound between Blido and Yxlan is entered by vessels with a draft of 15 3/4 feet.

The channel, between Staboudde and Mjolko (sec. 6D-6), lies parallel to the coast. It passes eastward of Mjolko and joins the

main eastern approach fairway leading to Tralhavet. A branch fairway, available to vessels with a draft of 26 feet, leads westward of Mjolko.

ICE CHANNELS.—See section 6C-6. The main channel from northward leading through Furusund and Tralhavet is kept open during the ice season.

PILOTS.—The pilot station at Soderarm is discontinued. The Arnholma Pilot Station is located at Naskubben (sec. 6D-5), on Bjorko. Pilots board inbound ships off Simpnasklubb (sec. 6D-1), about 2 miles seaward of the outer rocks. Outbound ships are met in the channel close southward of the pilot station. Pilots are available at any time on prior notice to Bjorko or Kopmanholm.

Pilots on all ships are exchanged at Furusund (sec. 6D-5). Local ports in the archipelago obtain pilots from Arnholma (Bjorko), or Furusund.

At Furusund, pilots maintain a watch at the lighthouse on Kopmanholm (sec. 6D-5). Ships are boarded in the channel and sound northward of Kopmanholm.

ANCHORAGES

6D-8 STYRJANS.—Anchorage, with local knowledge, can be taken in 6 1/2 to 20 fathoms, stones and clay, about 1 1/2 miles southward of Soderarm Light. Mooring rings in the harbor enable vessels with a draft of 11 1/2 feet to seek refuge.

GRANSKAR.—Anchorage can be taken in 9 to 14 fathoms, clay, in a bight on the eastern side of Bjorko opposite the southern end of Arnholma.

NORRTALJEVIKEN.—Anchorage can be taken in suitable depths, clear of dangers.

FURUSUND.—Anchorage can be taken in 9 to 14 fathoms, clay, off the northeastern side of Furusund Island with the light aligned with the eastern end of the island. Tenable anchorage can also be taken in 5 to 12 fathoms, clay, southwestward of the Furusund passenger pier.

VAXHOLM.—Anchorage can be taken in 6 1/2 to 11 fathoms and in 8 to 14 fathoms, clay, in the bay southward and northward of Vaxholm, respectively.

PART E. STOCKHOLM (59°20'N., 18°05'E.)

6E-1 The port of Stockholm, lying in the lee of the archipelago and about 30 miles from the sea, extends about 6 miles eastward and westward. The harbor, approached from the Baltic through channels previously described, lies at the outlet of Lake Malaren. The lake is a link in the canal system connecting Sodertalje (sec. 5C-5) and Vasteras (sec. 5C-8), with Stockholm.

NAVIGATION

6E-2 See section 5C-5, 6C-4, 6D-4.

WINDS-WEATHER

6E-3 See section 2-3.

ICE

6E-4 See section 6-5. Ice is prevalent in the archipelago fronting Stockholm during the ice season (December-March). Stockholm Harbor, and the principal fairways leading to the harbor, are kept open by icebreakers.

TIDES-TIDAL CURRENTS

6E-5 See section 6-4. There are no tidal or tidal current changes of the water level in the harbor. A current occurs in the inner part of the harbor when Lake Malaren discharges its water through open lock gates. An upstream current prevails occasionally.

DEPTHS-DANGERS

6E-6 See section 6C-6. The harbor is about 30 to 96 feet deep, clay and silt. The anchorages are about 11-to 16 1/2-fathoms deep. At Riddarfjarden, the eastern approach to Lake Malaren, there is 6-to 13-fathoms. The approaches leading to the more important parts of the harbor are at least 6 fathoms deep, accommodating ships with a draft of about 33 feet. Several oil installations are approached by ships of deeper draft.

The harbor, except for Fjaderholmarna (sec. 6C-5), is relatively clear of dangers. Shoals fringing the harbor and adjacent to navigable channels and passages are marked by lights and buoys.

LIMITATIONS.—On December 5, 1965 a tanker of 46,500 d.w.t., with a draft of 37 feet, berthed alongside the 850-foot pier at Loudden.

HARBOR

6E-7 LILLA VARTAN, a passage about 30 to 84 feet deep, forming the eastern side of the harbor, leads northwestward from the Fjaderholmarna islets. Blockhusudden is a point at the southwestern entrance of Lilla Vartan. A light is shown off the point. A 3-fathom shoal, marked by a buoy, lies in the fairway about 1/2 mile northeastward of Blockhusudden. Lights mark the ends of an obstruction lying off the northeastern side of Fjaderholmarna, close northward of a Degaussing Range. Submarine cables are laid across the entrance of Lilla Vartan.

Entrance on either side of Fjaderholmarna leads to Loudden, Frihamnen, and Vartahamnen, three of the major harbors of Stockholm, lying on the western side of Lilla Vartan. Vartagrundet Light is shown from the northeastern corner of the main pier at Frihamnen. Buoys mark the boundaries between the three harbors. A basin in Vartahamnen is 24 to 27 1/2 feet deep. The fairway leading to the piers in Vartahamnen accommodates ships with a draft of about 33 feet.

LIDINGO BRIDGE, about 1 mile northwestward of Vartahamnen, connects Lidin-gon (sec. 6C-5), and Stockholm. The bascule section, when closed, is 61 feet wide, and 17 1/2 feet above water level. Stocksund, at the northwestern extremity of the harbor, is approached through the bridge opening by vessels with a draft of 20 feet. Gas-verkshamnen, at the western terminus of the bridge, is approached through Askrike-fjarden (sec. 6C-6), and Lilla Vartan.

SKEPPSBRON (59°20'N., 18°05'E.), about 2 1/2 miles westward of Blockhusudden, is reached via Saltsjon and Strommen about 13 to 130 feet deep. The harbor at Skepps-bron is about 16 to 53 feet deep and extends northward for about 1/2 mile forming the eastern side of Staden.

STADEN, a narrow neck of land on which stands the Royal Palace, divides the harbor into eastern and western parts. An intricate lock system connects these parts.

STADSGARDEN, forming the southern side of Strommen, extends eastward for about 1 mile to the canal entrance leading to Hammar-byleden. The part of Saltsjon between the canal entrance and the narrow entrance

southward of Blockhusudden, is fringed by shoals, marked by buoys, along the northern shore. A lighted buoy marks the eastern side of a 3 1/4-fathom shoal in the fairway between Blockhusudden and the canal entrance.

HAMMARBYLEDEN (sec.5C-8), a seaway about 3 1/2 miles long and 20 feet deep, gives Lake Malaren a direct connection with the Baltic at Stockholm. A lock, about 1 1/4 miles southwestward of the canal entrance, is entered by vessels 361-feet long, 49-feet wide, with a draft of 18 1/2-feet. The seaway, marked by buoys, leads northward from the lock to the western end of the harbor. Between the canal entrance and the lock the shores are lined with quays. Many of the quays facing the shores northward of the lock are used by ships in the coastal trade.

RIDDARFJARDEN, the western part of the harbor, extends about 2 miles westward of Staden. It is about 11 to 65 feet deep. The northern and southern sides are lined with quays. Locks connect the eastern side with Skeppsbron and Strommen. Shoals, marked by buoys, fringe the northern shore, and there are 3 1/2-fathom patches near the fairway. Several islands lie adjacent to Riddarfjarden. Fairways lead between the islands to Stockholm and inland waterways. Bridges span the fairways.

The shore southward and southeastward of Lilla Vartan is indented by sounds about 39 feet deep. Several oil jetties with 36 to 38 feet alongside are located in the area.

Port regulations are available at the Harbor Office. Numerous cables and pipelines are laid across the various parts of the harbor. Lights and notice boards mark their landings. Speed regulations are in effect throughout the harbor, including special regulations for locks and bridge transit. In general, a speed of 7 knots is permitted westward of Blockhusudden; 5 knots approaching canals, sounds and bridges.

AIDS TO NAVIGATION

6E-8 EASTERN APPROACH.—Lights in range, 329 1/2°, shown on Sandhamns Stangskar (sec. 6C-3) and Stora Alskar (59° 18'N., 18°59'E.), lead through the approach fairway from seaward. The signal mast of

the yacht club and the customhouse on Sandon (sec.6C-2), aligned 305°, lead to Sandon entrance. Sandham Light (sec.6C-2), aligned 300° with a light close eastward of Sandon, leads northward of Svängen Buoy (sec.6C-3). Range beacons, 249°, standing on the south-eastern side of Hastkar (59°15'N., 18°54'E.), with Adkubben Light (sec.6C-3), lead through the fairway southward of Sandon. Lights in range, 350 1/2°, about 1 mile northward of the northwestern end of Sandon, lead through the fairway westward of Sandon.

NORTHERN APPROACH.—Lights in range 243°, shown on Ostra and Vastra Lerskaret (sec. 6D-3), lead through the approach fairway at Soderarm (sec. 6D-1). Hogskar and a beacon (sec. 6D-3), aligned 230°, leads from northeastward to the Arholma approach. Lights in range, 165°, on the southwestern side of Arholma (sec. 6D-1) lead through the northern entrance at Simpnasklubb. Arholma Beacon (sec. 6A-2), open eastward of Nas-kubben Light (sec. 6D-5) leads clear of the breakers about 1 1/4 miles northwestward of Simpnasklubb (sec. 6D-1).

PILOTS

6E-9 Sea, harbor, and inland waterways pilots can be obtained at any time from the pilot station at Skeppsbron (sec. 6E-7). Harbor pilotage is not compulsory. Pilot boats have radiotelephones, with the main transmitter at the Harbor Board Offices. Pilots are always available.

Swedish pilotage regulations and signals are described in section 1-104. See sections 6B-7, 6C-7, and 6D-7 for pilot information in the approaches to Stockholm.

ANCHORAGE

6E-10 Anchorage is prohibited throughout Stockholm harbor except in authorized areas. Anchorage can be taken at Lilla Vartan in 5 to 14 fathoms, at Strommen in 7 1/2 to 22 fathoms, and at Riddarfjarden in 4 1/2 to 10 1/2 fathoms. Mooring buoys are laid in many areas.

DIRECTIONS

6E-11 SOUTHERN APPROACH.—See section 5C-6. From the pilot cruising grounds steer 355° for Landsort Lighthouse until Viksten NW Lighthouse bears 027 1/2°. Steer

on this bearing passing between Bredgrund (sec. 6B-3 and Bulan, a 2 3/4-fathom shoal, marked by a buoy close eastward. When about 1/2 mile northward of Bulan steer 040° in the fairway between Viksten and Skrapan (sec. 6B-3). From Skrapan steer midchannel courses, passing westward of Maskuv, Ostra Roko, and Mysingeholm, eastward of Lilla Rothholmen and Aspo, to abeam of Dalaro. See section 6B-7 for continuation of directions to eastern approach and secondary channels.

EASTERN APPROACH.—See section 6C-4. From the pilot cruising grounds steer 329 1/2° on the approach range (sec. 6E-8) until the signal mast and customhouse on Sandon are aligned, 305°. Steer on this bearing, passing westward of Svängen and the 4-fathom patch (sec. 6C-3). Thence steer 258° for Adkubben Lighthouse, remaining in the white sector of the light. Pass northward of Adan Buoy (sec. 6C-3), steering 357° and 350 1/2°, respectively, on the ranges westward and northward of Sandon (sec. 6E-8). See sections 6C-5 and 6C-6 for continuation of directions in the eastern approach to Stockholm.

NORTHERN APPROACH.—See sections 6D-4, 6D-7. From about 1 mile northward of Soderarm Lighthouse, steer 243° on the approach range (sec. 6E-8), until about 1 1/2 miles from the front range light. This course leads close southward of Remmargrund (sec. 6D-5). Thence steer 252° for Botveskar Light (sec. 6D-3), passing close northward of the lighted buoy moored about 1/2-mile westward of the front range light. Steer a course from the buoy to pass about 1/4 mile southward of Botveskar. Thence steer 257° for Kapellskar (sec. 6D-5), being guided by the lights and their white sectors denoting the fairway leading through Furusund Channel.

The Arnholma entrance is approached from northeastward by steering 230° for Hogskar Lighthouse (sec. 6D-3), passing close northwestward of the light and adjacent beacon. Thence a course of 190° leads close eastward of Svedudden (59°51'N., 19°05'E.). At night, ships are guided by the white sectors of Hogskar, Svedudden, Tyfo, and Kapellskar Lights.

The Simpnasklubb entrance is approached from northward by steering 165° on the entrance range (sec. 6E-8), passing close west-

ward of Simpnasklubb and between the buoyed dangers to a junction with the Arnholma fairway.

FACILITIES

6E-12 STOCKHOLM, the capital of Sweden, and a major seaport, has a population of about 800,000. The city and environs constitute an industrial center dependent on the port for the influx of raw materials and distribution of manufactured products. Stockholm, a port of entry, consisting of about twenty separate harbor installations on the mainland and adjacent islands connected by numerous bridges, is divided into a Customs Port and Free Port.

Exports include machinery, steel, paper, and manufactured products. Imports include raw materials, ores, fuel oils, and commodities.

The United States maintains an embassy in the city.

BERTHS.—Louden, in Lilla Vartan (sec. 6E-7), is the largest oil installation in port. There are numerous quays about 100 feet long with 29 feet alongside. A finger pier, 853 feet long with 39 feet alongside accommodates tankers of 35,000-to 45,000-d.w.t. Wharves with 34 1/4 feet alongside have berths for tankers of 25,000 d.w.t., with a draft of 33 feet.

Frihamnen, the free port adjacent to Louden, is about 25 1/2 to 33 1/2 feet deep. It is the largest general cargo harbor, mainly used for storage of imported goods. The pier and basin has over 4,900 feet of quays with 25 1/2 to 33 1/2 feet alongside. The port has extensive warehouses and numerous cranes with a capacity of 2 1/2 to 80 tons. Floating cranes of 220 and 260 tons capacity are available.

Vartahamnen, adjacent to Frihamnen, is the main harbor for bulk and oil cargoes. There are about 2,700 feet of berths with 26 1/2 to 36 feet alongside. Ferries (auto and railroad) ply between the harbor and Finland. Harbor quays total about 8,300 feet with 17 1/4 to 36 feet alongside. There are numerous cranes with a capacity of 2 1/2 to 10 tons. The Gas Works, adjoining Vartahamnen, has a quay about 1,300-feet long with 14 to 29 feet alongside. There are several 10-ton cranes on the quay.

Skeppsbrohamnen is the terminus for passenger and cargo transport to and from Finland. The harbor quay is 1,870 feet long with 19 to 21 feet alongside. There is a customhouse on the quay, and several cranes of 5 to 7 1/2 tons.

Stadsgardshamnen is used for regular European general cargo traffic. Quays total about 6,300 feet with 23 to 32 feet alongside. There is a customhouse and numerous cranes with capacities of 2 1/2 to 7 1/2 tons on the quays, also a terminal for passengers to and from Finland and the U.S.S.R.

Norra Hammarbyhamnen, on the northern side of the seaway, is used for both general and bulk cargoes. Quays extend about 5,000 feet with 21 feet alongside. There are numerous cranes with a capacity of 3 to 6 tons and one 20 ton crane.

Sodra Hammarbyhamnen, on the southern side of the seaway, is used for lumber, steel, and automobile shipping. Quays extend about 3,000-feet with 21 feet alongside. One quay is 1,800 feet long. A ferry ramp is used for unloading autos from special-type ships. There are several 4 and 5 ton cranes.

Arstadalshamnen, on the southwestern part of the seaway, is a bulk cargo harbor. About 1,600 feet of quays have 22 1/2 feet alongside. A quay, 395 feet long, is utilized for the discharge of bulk cargoes of wine piped to underground vats.

Malarstrand, on the northern and southern sides of Riddarfjarden, have over 7,000 feet of quays with 14 to 21 feet alongside. Some

private quays have 42 1/2 feet alongside.

The majority of the quays in the harbor are served by the railroad. Numerous lighters and tugs are available.

SUPPLIES.—Ships' supplies and provisions are procurable in quantity. Fuel and diesel oils are available at some quays and by oil barges. Water is piped to most quays. There are water boats. Compass adjusters are available. Charts and nautical supplies can be obtained.

REPAIRS.—Major hull and engine repairs can be made to ships up to 15,000 d.w.t. There are several drydocks and floating docks. The largest drydock is about 637-feet long (maximum), 80-feet wide, and 31 1/2 feet deep over the sill. The largest floating dock is 478 feet long, 78 feet wide, with a lifting capacity of 8,200 tons. There are marine railways and a salvage vessel in port.

COMMUNICATIONS.—Harbor installations are connected with the national railroad system. About fifty shipping lines operate world-wide. There are radio and cable facilities. Arlanda International Airport is located about 25 miles from the city. An inter-Scandinavian airport is located at Bromma, about 5 miles from Stockholm.

DERATTING.—See section 1-4.

MEDICAL.—There are several excellent hospitals. There is a Quarantine station in Stockholm (sec.1-100). Ships are assigned moorings at Vartahamnen (sec.6E-7), south-eastward of Lidingo Bridge.

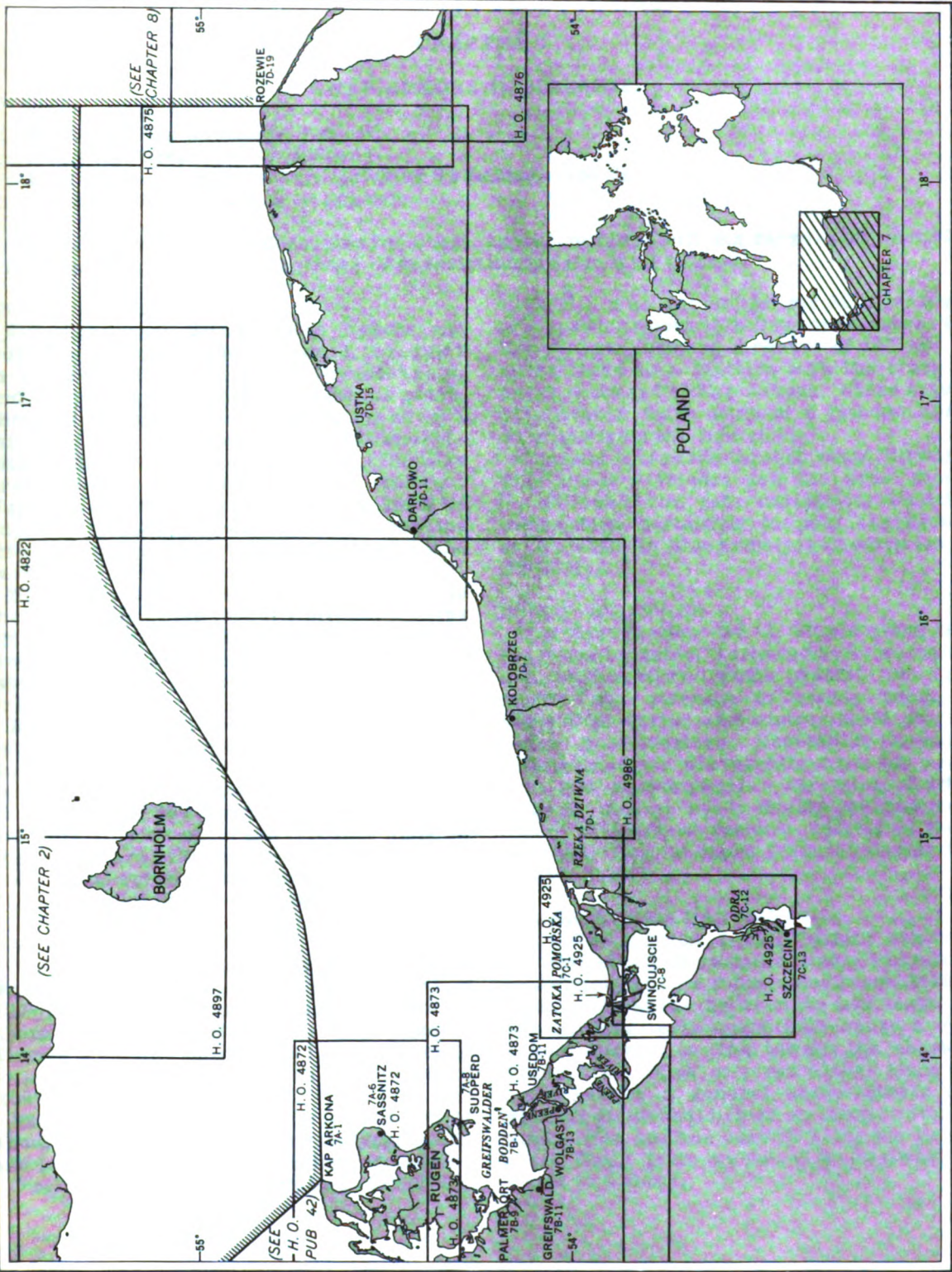


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office. Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 7—GRAPHIC INDEX

CHAPTER 7

KAP ARKONA TO ROZEWIE

PART A. Kap Arkona to Sudperd

PART B. Greifswalder Bodden

PART C. Pomeranian Bay, including Swinoujscie and Szczecin

PART D. Rzeki Dziwna to Rozewie

Plan.—This chapter describes the coast, approaches, and offlying dangers between Kap Arkona and Rozewie. The sequence of description is from west to east.

GENERAL REMARKS

7-1 The coast between Kap Arkona and Rozewie, about 172 miles eastward, is regular in outline, heavily wooded for the most part, and backed by steep cliffs in several areas. Shoals fronting the coast extend for about 1 mile offshore except where bays and the outlets of major rivers indent the coast. In these areas shoals extend about 10 miles offshore. Numerous lakes fronted by narrow spits lie adjacent to the coast. Several rivers flowing into the sea have branches forming inland bays.

Numerous wrecks and foul patches lie inside the 10-fathom curve, about 1 mile to 5 miles off the western and eastern shores, respectively. Prohibited areas, described with related features, lie near the approaches to principal ports.

Kap Arkona and Rozewie are salient points approaching from seaward. The coast between these points forms a broad bight. The major ports of Swinoujscie and Szczecin are located at the head of the bight. Sassnitz, a port on the eastern side of Rugen Island is situated northwestward of Swinoujscie. Swept channels lead in the approaches to these ports. NEM-EDRI (sec. 1-118) should be followed.

NAVIGATION

7-2 From a position about 3 miles eastward of Stevns Klint (sec. 2-2), a course of 127° for about 62 miles leads to a position about 20 miles eastward of Kap Arkona. Thence a course of 084° for 151 miles leads to a position about 5 miles northward of Rozewie.

These tracks pass over a least depth of about 10 fathoms on Kriegers Flak (sec. 2A-3), and lead southward of Adlergrund (sec. 2C-9).

From Gedser Rev Lightship (54°25'N.,

12°09'E.), a course of 056° for 36 miles leads to a position about 15 miles northwestward of Kap Arkona. Thence a course of 107° for 35 miles leads to a junction with the track 20 miles eastward of Kap Arkona. These tracks pass over a least depth of 6 fathoms about 10 miles from the lightship.

Courses lead partly through swept fairways. The latest Nemedri for the area should be followed for safe navigation. Detailed information pertaining to port approaches is included in the principal description of the ports.

WINDS—WEATHER

7-3 See section 1-133. Winds along this coast are variable. Northwestern, westerly, and southwesterly winds prevail. The frequency and strength of strong winds is highest in spring and winter. Most storms occur in November, December, January, February. They are usually from the westerly and southwesterly direction. Northeasterly storms occur during the summer. There are violent summer squalls of short duration. Fog is more frequent during the winter.

CURRENTS—WATER LEVEL

7-4 See section 1-122. Surface currents are influenced by variable winds. Prevailing westerlies cause a southeasterly set. Winds, turning clockwise between the northeasterly and northwesterly quadrants cause a 3 to 4 knot current to flow toward the coast of Rugen. The influx of river waters along the coast causes a general northeasterly set, which if disturbed, brings on strong westerly winds. The surface current along the Polish coast flows from westward to eastward at 1 knot to 2 knots.

WATER LEVEL.—Winds from southeastward to west-northwestward lower the water level. Strong southwesterly winds cause the level to drop about 5 feet. Winds from north-westward to east-southeastward cause the water level to rise. Strong northeasterly winds raise the level about 6 1/2 feet.

ICE

7-5 See section 1-126. Ice forms along this coast between the middle of January and the middle of March. Shipping in some areas may be stopped for three weeks.

PART A. KAP ARKONA TO SUDPERD

7A-1 KAP (CAPE) ARKONA (54°41'N., 13°26'E.), the northern extremity of Rugen Island, is a barren and conspicuous headland formed by light-colored chalk cliffs. It is steep-to and can be approached up to 1 mile offshore by ships rounding the cape.

A light is shown from a lighthouse on the cape. A disused light tower stands close southeastward. A fog signal is sounded close northward, and storm signals (sec. 1-58) are displayed close northwestward, of the lighthouse.

There is a radar station on the cape. The cliffs give good radar returns for a considerable distance offshore.

COAST—GENERAL

7A-2 In approaching Kap Arkona, with poor visibility, care must be taken to avoid mistaking the high land about 5 miles westward of Arkona for the cape.

The eastern side of Rugen Island is mostly high and steep-to, visible from afar, giving clear radar returns on an easterly approach. The sheer, chalk cliffs at Stubnitz (54°33'N., 13°40'E.), are first seen from about 25 miles offshore. The southeastern part of Rugen is low and sandy.

The coast southeastward of Rugen is wooded, fronted by Pomeranian Bay (sec. 7C-1), and presents few landmarks other than churches and occasional lighthouses. The coast for about 150 miles east-northeastward from the head of the bay consists of sand dunes, some about 200 feet high. Scattered lagoons back the low dunes in places. The bottom is sandy, with mud offshore.

DEPTHS—DANGERS

7A-3 The 10-fathom curve lies about 1 mile off the northern and eastern coast of Rugen. The very few isolated dangers seaward of the curve are charted. The bottom is sandy in the bays and rocky off the points. From Nordperd (54°21'N., 13°46'E.), south-southeastward along the coast, depths of 4 to 7 fathoms predominate. The 5-fathom curve extends from about 1 mile off Nordperd to 5 miles off Pomeranian Bay. At Usedom, about 10 miles southward of Nordperd, a shoal of less than 2 fathoms extends about 7 miles northeastward. The few dangers and wrecks seaward of the 5-fathom curve can be seen on the chart. From Nordperd the 10-fathom curve extends about 5 miles northward of Oder Bank, thence southeastward and eastward to Rozewie. Numerous wrecks and patches, best seen on the chart, lie inside the 10-fathom curve.

Odrzana Lawica (Oder Bank), between 3 1/4 and 5 1/2 fathoms deep, lies about 13 to 34 miles northward from the head of Pomeranian Bay and is about 25 miles wide. This sandy bank is steep-to except along its northern side. Adlergrund (sec. 2C-9), lies about 17 miles northward of Oder Bank.

Slupska Lawica (Stolpe Bank), is an extensive sandy bank 4 1/4 to 10 fathoms deep lying about 13 miles offshore and 60 miles west-northwestward of Rozewie.

NAVIGATION

7A-4 Consult NEMEDRI. From a position about 7 miles northeastward of Kap Arkona a swept channel, marked by lighted buoys, leads south-southeastward for about 28 miles to abeam of Sudperd (sec. 7A-8). The channel is about 8 3/4 fathoms deep and closes Stubnitz (sec. 7A-2), about 2 1/2 miles distant.

COASTAL FEATURES—LANDMARKS

7A-5 BETWEEN KAP ARKONA AND SUDPERD, a point about 27 miles south-southeastward, the coast is indented by two extensive bays separated by Jasmund Peninsula. The shores are generally high and steep except along the inner sides of the bays, also between Nordperd (sec. 7A-8) and Sudperd, where it is low and sandy.

Arkona Riff, a rocky reef of 2 1/4 to 5 1/4 fathoms, extends about 1/2 mile east-

ward of the cape. A tide gage stands about 150 yards northeastward of Arkona Light-house.

Tromper Wiek, a bay, indents the coast for about 5 miles southward of the cape. Schaabe, a wooded, low, sandy, isthmus forms the inner bay. The northern and southern shores of the bay are fringed by rocky shoals. Anchoring is untenable inside the 5-fathom curve, less than 2 miles offshore. The greater part of the bay is 5 to 11 fathoms deep, sand and mud. A light is shown from Glowe, a village on the southern side of the bay. Two radio masts stand about 1/2 mile eastward of the light.

Jasmund, a broad peninsula forming the southern side of Tromper Wiek, extends eastward for about 6 miles to Ranzow (54° 35'N., 13°38'E.), the northern point of Jasmund. A light is shown at Ranzow.

PROHIBITED AREA.—An area in which anchoring and fishing is prohibited, extends about 4 and 5 miles northeastward and south-eastward of Ranzow, respectively. The western side of the area, about 2 miles offshore and between 3 and 4 miles from Ranzow, is laid off in measured miles. Lighted buoys in range with beacons ashore mark each mile. Buoys are moored at terminal points at each end of the range and at each corner of the distance area.

Lohme, a fishing harbor and bathing resort about 1 mile westward of Ranzow, is formed by two moles. The entrance, from northwestward, leads in about 5 to 8 feet to a harbor about 3 1/2 feet deep. Obstruction lights, atop high radio masts close southward of the harbor, are conspicuous.

The eastern side of Jasmund is high, wooded, and fronted by a narrow, rocky, steep-to reef. Stubnitz (sec. 7A-2), and a tall mast with galleries located about 1 1/4 miles southeastward of Ranzow are prominent. Storm signals are displayed. At nearby Stubbenkammer a radiobeacon transmits.

Kollicker Ort, about 2 miles southeastward of Ranzow is the eastern extremity of Jasmund. A light is shown and a fog signal is sounded at Kollicker Ort. The coastal reef extends about 1/2 mile offshore.

SASSNITZ (54°31'N., 13°39'E.)

7A-6 Sassnitz Harbor is an important fishing center and the terminus of a railroad and passenger ferry from Trelleborg, Sweden (sec. 2A-11).

NAVIGATION.—See section 7-2. **NEMEDRI** should be followed in the approaches to Sassnitz.

ICE.—See section 7-5. The harbor remains free of ice longer than other comparable ports in the area.

CURRENTS—WATER LEVEL.—See section 7-4. The average water level varies about 1 1/2 feet above and below mean water.

DEPTHS—DANGERS.—There is about 27 feet in the harbor approach and 26 feet in the entrance between moleheads. The southwestern part of the harbor is about 19 1/2 to 23 feet deep; the northeastern part shoals to about 17 feet. Depths in the harbor and entrance are subject to considerable variation due to silting. Dredging is carried out periodically. Vessels with a draft of 18 feet can enter the harbor and berth alongside.

A shoal of less than 3 fathoms fronts the eastern mole, extending about 1/4 mile offshore its root. A rocky coastal shoal, 2 to 3 fathoms deep, extends offshore to the western side of the approach channel.

LAND MARKS.—Chalk quarries directly above the harbor and a very high radio mast topped by obstruction lights, standing northward of the harbor, are good landmarks approaching Sassnitz.

HARBOR—REGULATIONS.—The harbor is formed by a long eastern mole and a short western mole, the latter extending offshore to form an entrance 140 yards wide between the eastern molehead and the western mole. Quays front the length of the harbor and extend along the inner half of the eastern mole. Several piers, some L-shaped, extend offshore about 400 feet. Quays and piers at the northeastern part of the harbor are used by the fishing fleet. Dolphins stand at the head of the piers. Naval units berth in the southwestern harbor. Ferry slips are located northward of the western molehead.

Regulations are in effect which prohibit anchoring and fishing in or near the approach

channel, near moleheads, or between the entrance and ferry slips.

All vessels, except large commercial ships, on entering and departing the harbor must stop at the customs office, located at the head of the main pier, for examination.

Vessels must not exceed a speed of 2 1/2 knots, and passing is forbidden within the harbor area. Outbound vessels take precedence over vessels entering, except for the ferries. The latter have the right-of-way at all times.

AIDS TO NAVIGATION.—The western side of the entrance channel is marked by three lighted buoys. Lighted bell buoy "1" is moored about 1/2-mile south-southwestward of the eastern molehead. Lighted buoys "2" and "3" are aligned between "1" and the western molehead.

Lights are shown from the eastern and western moleheads. Fog signals are sounded at the eastern molehead and on the ferry slips. Lights are shown from the root of piers and from dolphins off pierheads. Lights in range, 020°, are shown near the root of each ferry landing.

Lights in range, 008°, shown from the quay about 300 yards northward of the western molehead, lead through the entrance channel.

SIGNALS.—Storm signals are displayed near the head of the harbor. Traffic signals are shown at the ferry slips. A radio range (Pub. 117A), located on the coast about 1 1/2 miles southwestward of the harbor entrance, leads from northward to the entrance channel.

PILOTS.—See section 1-105. Pilotage is compulsory. Pilots can be obtained in Sassnitz Roads, eastward and southeastward of the harbor entrance.

ANCHORAGE.—Anchorage can be taken in 6 1/2 to 7 1/2 fathoms, sand and stones, in the roads southeastward of the harbor.

DIRECTIONS.—From a position in 54°32'N., 13°46'E., steer a course of 244° on the radio range for about 5 miles to a position about 1/4-mile northeastward of Sassnitz Lighted Bell Buoy "1". Thence steer 008° for the western molehead and the lights in range ashore. When abeam of the eastern molehead steer a midchannel course through the entrance and into the harbor.

7A-7 SASSNITZ, with about 20,000 inhabitants, is a naval base and headquarters of

a fishing combine operating in the Baltic and North Sea. The town is built on terraces behind the harbor. There are modern freezing and fish processing plants. Chalk quarries are located inland. Sassnitz is a port of entry.

BERTHS.—The port is fronted by a main quay from which numerous piers extend into the harbor. Vessels with a draft of 18 feet can berth alongside the main piers, and about 17 feet at the fish piers. Several cranes of 4 to 6 tons and a 50-ton floating crane are available.

SUPPLIES.—Ships' stores and provisions are available in limited quantities. Water is piped to ferry slips and some piers. Diesel oil and fuel oil are available. There is at least one tug which must be used in the harbor.

REPAIRS.—There are no drydock facilities. Minor hull and engine repairs are made. There is a marine railway for small fishing vessels.

COMMUNICATIONS.—There are rail and road connections from Sassnitz throughout Rugen Island, and the mainland via Stralsund. Ferries ply between the port and Trelleborg, Sweden. There is a shipping and passenger service to East German ports.

DERATTING—QUARANTINE.—See sections 1-7 and 1-100, respectively.

COASTAL FEATURES—LANDMARKS (Continued)

7A-8 The coast between Sassnitz and Sudperd is indented by Prorer Wiek, a bay terminating at Granitzer Ort (54°24'N., 13°40'E.), a high, wooded point about 6 1/2 miles southward of Sassnitz.

Prorer Wiek is about 7 to 9 1/2 fathoms deep up to the 5-fathom curve lying about 1 mile offshore. The coastal shoal is narrow and foul. The bay has a bottom of fine sand and shells, with rocks off the northern shore. A low, sandy isthmus forms the inner side of the bay. Landmarks approaching the bay include a castle on the northern shore, conspicuous buildings at Binz, a summer resort on the southern shore, and a memorial at a height about 8 miles westward of Granitzer Ort.

Submarine cables are laid from the shore close northwestward of Binz to Bornholm (sec. 2C-11).

Seehunds Riff, a partially drying reef, extends about 1/2 mile offshore between Granitzer Ort and Binz. A buoy marks the northwestern edge of the reef.

NORDPERD (54°20'N., 13°46'E.), a point at the eastern extremity of Rugen Island, is located about 5 miles southeastward of Granitzer Ort. The point is high, wooded, with steep clay sides. A conspicuous tower stands about 3/4 mile westward of the point. Foul ground, the outer edges marked by buoys, extends about 1/2 mile northward and southward of Nordperd.

Quitlas Riff, a reef with 2 feet least water, extends about 3/4-mile off Quitzlaser Ort, a steep point about 2 miles southeastward of Granitzer Ort. Buoys mark the seaward sides of the reef. At Sellin, a summer resort close northwestward of the point, there are several conspicuous buildings, and a pier approached with local knowledge.

SUDPERD (54°17'N., 13°44'E.), a point about 4 1/2 miles south-southwestward of Nordperd, is high and steep on the southern side but slopes gradually to a low, sandy beach on the northern side. The low coast to Nordperd, backed by separate high hills, appears as four islands from offshore. Foul ground, marked close eastward by a buoy, extends about 1/4 mile eastward, and 1-fathom shoals a mile southward, of Sudperd. Steintrendel, a 1 1/2-fathom rock, lies about 1 1/2 miles eastward of Sudperd. A 2 1/2-fathom patch, marked by a buoy, lies close northward of the rock. Foul ground, marked close seaward by buoys, extends up to 1 mile offshore between Nordperd and Sudperd.

At Thiessow, a village close westward of Sudperd, there is a pilot station, lookout tower and a signal mast. Pilots can be obtained, during daylight, for all the harbors on Rugen Island and the adjacent mainland. Storm signals are hoisted during the day and at night. During the ice season (Jan.-Mar.), pilots are transferred to Sassnitz.

ANCHORAGES

7A-9 PRORER WIEK.—Sheltered anchorage can be taken in 1 1/2 to 2 1/2 fathoms inside Seehunds Riff.

BINZ.—Anchorage can be taken in 2 1/2 to 3 1/2 fathoms close northeastward of Binz.

SUDPERD.—Anchorage with offshore winds, can be taken in 4 1/2 to 5 fathoms, sand, between Sudperd and Nordperd.

SASSNITZ.—See section 7A-6.

PART B. GREIFSWALDER BODDEN

7B-1 Greifswalder Bodden is an extensive bay entered eastward between Sudperd (sec. 7A-8), and the northern end of Usedom, about 6 1/2 miles southward. Channels lead from seaward to ports on Rugen Island and the mainland. Wolgast is the principal port herein described.

COAST—GENERAL

7B-2 The northern side of the bay is formed by the southern coast of Rugen. The shores are heavily indented and irregular with broad outcroppings of terrain, high cliffs, valleys, and peninsulas backed in many places by inland lakes. Numerous shoals and reefs, with deep water between, front this coast. Rugischer Bodden is the northern part of the bay.

The coast forming the southern side of the bay is low-lying and mostly wooded. Danische Wiek, at the southwestern corner, is an inlet into which the Ryk River flows. At the southeastern side of the bay lies the mouth of the Peene River, close westward of Usedom. The numerous churches serve as landmarks.

DEPTHS—DANGERS

7B-3 An extensive sand flat, rising gradually from the sea and dropping abruptly towards the bay, lies in the eastern entrance of Greifswalder Bodden. The flat is about 1 fathom deep in many places. Greifswalder Oie and Ruden are islands lying on the northeastern and southern parts of the sand flat, respectively. The flat is enclosed by the 3-fathom curve and is widest between the islands. Dredged channels lead across the flat to Greifswalder Bodden.

The bay is generally about 3 1/4 to 6 fathoms deep with a bottom of sand and mud. Vessels with a draft over 6 1/2 feet must exercise caution to avoid rocks on the bottom of bays along the southern coast of Rugen. The bays shoal to 2 fathoms or less, with detached shoals lying up to 2 1/2 miles off islands and

peninsulas. Passages, 4 to 5 fathoms deep, leading to minor ports are to be used only with local knowledge. The coastal shoal, less than 2-fathoms deep, extends up to 1 1/2 miles offshore along the southern and western sides of the bay.

Gross Stubber, several drying rocks 5 miles southwestward of Sudperd (sec. 7A-8), and detached shoals of 1 1/2 to 2 3/4 fathoms lying northward and southward of the rocks, are marked southward by Elsagrund N. Lighted Buoy, moored about 5 miles south-southwestward of Sudperd.

Klein Stubber and Schumacher Grund, rocky 1 1/4 fathom detached shoals marked by buoys, lie close eastward of Gross Stubber. Several patches, some marked by buoys, lie on the sides of the shoals.

Passages, 4 to 5 fathoms deep, lead between the various shoals. These are marked in accordance with the E. German system of buoyage (sec. 1-32) and are best seen on the chart.

A prohibited area, about 2 miles in extent, lies in the center of the bay close westward of Gross Stubber.

OFFLYING ISLANDS AND DANGERS

7B-4 Greifswalder Oie (54°15'N., 13°55'E.), an island about 7 miles east-southeastward of Sudperd (sec. 7A-8), lies on the north-eastern side of the sand flat fronting the bay. The island is steep on all sides. A reef, steep-to, lies off the northeastern side. Numerous sunken rocks lie about 2 1/2 to 3 miles eastward of the island. Steingrund, a 3-fathom patch, lies about 2 1/2 miles northwestward. A light is shown from the northeastern end of Greifswalder Oie. A fog signal is sounded at a tower close eastward. Storm signals are displayed from a mast close northeastward of the lighthouse. Beacons at the southern end of the island mark a cable range to Ruden.

A fishing harbor, closed to shipping, at the southwestern end of the island is formed by two moles connected by an outer breakwater. The harbor, about 9 feet deep, is entered through entrances at the northern and southern ends of the breakwater, about 10 feet and 2 1/2 feet deep, respectively. The harbor, subject to silting, is open to westerly gales. Lights are shown from each molehead. Vessels approaching the harbor from southward

should pass westward of a lighted buoy moored about 2 miles westward of the harbor, and a buoy marking a rock off the northern molehead.

CAUTION.—During August and September fishing nets are set out within 5 miles eastward of the island. Oier Riff, a partly drying rocky reef, extends about 2 miles southwestward of Greifswalder Oie.

Der Ruden (54°12'N., 13°46'E.), a low island about 1 mile off the coast and 5 miles south-westward of Greifswalder Oie, terminates southward in a sandy spit, steep-to off its southern and eastern sides. A small harbor formed by moles on the eastern side of the island can be entered by vessels with a draft of 6 1/2 feet. Lights are shown from the moleheads. Beacons mark cable landings at the northern and southern ends of the island. Range beacons, 271 1/2', consisting of mast and framework structures having triangular daymarks, stand near the northern end of Der Ruden. A light is shown close southward of the beacons. Lights in range, 239 1/2', are shown from structures standing about 1/2 mile southward of the range beacons. Lights are shown close offshore about 3/4 mile southward of the front range light and at the southern end of the sand spit.

Pilots are stationed near the northern end of Der Ruden. Watch is maintained at a conspicuous tower close southward of the station. Pilotage is compulsory.

NAVIGATION

7B-5 See section 7A-4. From abeam of Sudperd steer south-southeastward in the swept channel for 8 miles to a position about 5 1/2 miles eastward of the southern extremity of Greifswalder Oie (sec. 7B-4). Thence a course of 254° for about 7 miles leads to the pilot cruising grounds 4 miles eastward of Der Ruden.

From a position about 6 miles east-northeastward of Nordperd (sec. 7A-8), a course of 218° for about 10 miles leads to the pilot cruising grounds and through the secondary channel southeastward of Sudperd.

CURRENTS—WATER LEVEL

7B-6 Surface currents follow wind direction in Greifswalder Bodden. With strong winds between north and northeast the current

sets to the southward and southwestward at 4 to 6 knots. With southerly winds the current divides at Sudperd, one branch along the southern side of Rugen Island and turning southwestward uniting with an easterly current. With winds between east and west, through south, the current sets northward and northeastward at 2 to 5 knots. In calm weather, a strong current will set southwestward with low water in the Baltic and the reverse with high water. Strong southwesterly and northeasterly winds may lower or raise the water level about 3 feet, respectively.

ICE

7B-7 Heavy ice formation may prevent shipping in the bay from 3 to 8 weeks during severe winters. In average years, shipping may be hindered for 2 weeks, but not stopped during January and February. Southwesterly storms clear the bay of ice. The ice season usually is between Christmas and the middle of March.

CHANNELS—PILOTAGE

7B-8 See section 7B-5. Two approach channels lead into Greifswalder Bodden. Landtief (54°16'N., 13°44'E.), the northern channel is 19 1/2 feet deep, dredged through the sand flat (sec. 7A-12), for about 2 1/4 miles. Vessels with a draft of 16 1/2 feet are allowed. The channel entered from seaward about 1/2 mile southeastward of Sudperd (sec. 7A-8), is marked by buoys, with radar reflectors, according to the East German system (sec. 1-33). Landtief lighted whistle buoy is moored in the channel approach about 1 1/2 miles northeastward of Sudperd.

Pilots from Thiessow (sec. 7A-8) can be obtained in the vicinity of the whistle buoy. Pilotage is compulsory for Landtief. During the ice season pilots can be obtained at Sassnitz on prior notice (sec. 7A-6).

OSTTIEF, the southern channel, is dredged to 19 1/2 feet for about 1 1/2 miles through the sand flat fronting Greifswalder Bodden. Vessels with a draft of 16 1/2 feet can enter the channel which leads to a roadstead close eastward of Der Ruden (sec. 7B-4).

LOCH, a channel 24 to 30 feet deep, leads from the roadstead southward and westward of the southern extremity of Der Ruden into Greifswalder Bodden. Osttief and Loch are

marked by buoys, with radar reflectors, according to the East German system.

Osttief Lighted Whistle Buoy, with a radar reflector, is moored in the seaward approach to Osttief, about 4 miles eastward of Der Ruden. Range beacons (sec. 7B-4) lead southward of Oier Riff to the whistle buoy and the entrance of a buoyed channel leading to Osttief. Range lights (sec. 7B-4), lead through Osttief. Veritasgrund, a 3-fathom shoal marked by buoys, lies at the outer entrance of Osttief. The preferred fairway lies northward of the shoal. The current sets northeastward across the Osttief approaches with westerly winds.

Pilots (sec. 7B-4) can be obtained in the vicinity of the whistle buoy during daylight. Pilotage is compulsory.

COASTAL FEATURES—LANDMARKS

7B-9 BETWEEN SUDPERD AND PALMER OBT (54°13'N., 13°24'E.), a point about 12 miles west-southwestward, the coast is indented about 6 miles by a broad bight and several small bays. Zickerer See, a bay about 1 mile northwestward of Sudperd, is fronted by a shoal extending about 2 miles offshore. A buoyed channel, aligned with range beacons on the eastern shore, leads in 7 1/4 feet to a pier at the southeastern corner of the bay. Zickersches Hoft is a bold promontory forming the extreme western side of Zickerer See. A light is shown 1/2 mile inside the promontory.

Reddevitzer Hoft is a steep point at the outer end of a long, narrow peninsula about 1 3/4 miles northwestward of Zickersches Hoft. Shallow inlets lie northward and southward of the peninsula and shoals extend about 1 1/4 miles westward and southward of the point. Buoys mark the outer limits of the shoals. A submarine oscillator, 1 1/4 fathoms deep, located about 2 1/2 miles southwestward of Reddevitzer Hoft, is marked by a lighted buoy and connected to the point by a submarine cable. Buoys mark the cable. Anchorage is prohibited in the area and in another cable area, marked by buoys, lying about 1 mile northwestward of the point.

Muglitzer Ort (54°20'N., 13°33'E.), is a point about 2 1/2 miles northwestward of Reddevitzer Hoft. Der Vilm, a restricted island, lies about 3/4 mile southward of

Muglitzer Ort. Shoals of 1 1/2 fathoms extend from the point to 2 miles southward of Der Vilm. Reefs of less than 2 fathoms lie up to 1 1/2 miles westward of the island. A light is shown from the northeastern side of Der Vilm. A submarine cable is laid between the northern end of the island and Muglitzer Ort.

LAUTERBACH, a fishing harbor formed by two moles extending offshore, is located about 1 3/4 miles westward of Muglitzer Ort. The harbor is connected by railroad to Putbus, the county seat about 1 mile inland. There is a concrete quay and several wooden piers in the harbor. Restricted launch service to Der Vilm is available at one of the piers. A directional light is shown from the head of the western mole. The harbor is shallow. A channel, entered between moleheads, is about 8 feet deep and marked by dolphins. Eastern and western approach channels lead to Lauterbach. The western, about 17 1/2 feet deep, leads northward from Greifswalder Bodden between buoys marking the channel and the shoals westward of Der Vilm. The eastern, about 10 feet deep, is approached through a channel marked by range lights and buoys moored westward of the shoals lying in the eastern part of Greifswalder Bodden. Prominent church steeples in range, best seen on the chart, lead from a dumping ground marked by buoys, to the narrow, buoyed 10-foot channel lying northward of Der Vilm.

PALMER ORT, the prominent southern extremity of Rugen Island and Zudar Peninsula, is located about 8 miles south-southwestward of Lauterbach. The intervening coast is fronted by a shoal extending to the 3-fathom curve, about 1 mile offshore.

7B-10 BETWEEN PALMER ORT AND KOOS, an island lying close-off the mainland about 2 1/2 miles southward of Palmer Ort, is the southeastern approach to Stralsund. This harbor and its western approach is described in Pub. 42.

Extensive shoals fronting Rugen and the mainland lie adjacent to the approach channel leading to Stralsund. The channel extends about 14 miles west-northwestward from Palmer Ort Lighted Bell Buoy, moored 2 miles east-southeastward of Palmer Ort.

The eastern part of the channel is dredged to 19 1/2 feet for about 2 miles. Between Palmer Ort bell buoy and a lighted bell buoy moored about 1 1/4 miles westward the channel is 18 feet deep. Vessels with a draft of 16 1/2 feet can enter the channel and proceed to Stralsund. The channel, best seen on the chart, is marked by buoys according to the East German system. Range lights, shown on the shore northward of the channel, lead through the various channel reaches.

The southern side of Rugen, northward of the channel, is indented by several shallow inlets. Drigge (54°17'N., 13°09'E.), is a salient peninsula jutting into the channel about 9 1/2 miles from Palmer Ort. Winding reaches of the channel lead southwestward and westward of Drigge. Range lights on the mainland lead through the reaches. Danholm, an island fronting Stralsund, lies on the western side of the channel about 1 1/2 miles from the southern end of Drigge. Ziegelgraben, a buoyed branch channel available to vessels with a draft of 16 1/2 feet, leads from westward of Drigge between Danholm and Stralsund. Range beacons on the mainland southward of Drigge lead through the channel. Submarine cables are laid between Stralsund, Drigge, and the coast southward and northward of Drigge. Buoys mark the cables.

STAHLBRODE (54°14'N., 13°17'E.), a fishing harbor formed by two moles, is located about 3 3/4 miles westward of Palmer Ort. A dredged channel about 8 1/2 feet deep leads between moleheads into the harbor, about 8 feet deep. A light is shown from the southern molehead. Storm signals are displayed at the harbor. A ferry plies between Stahlbrode and Giewitzer, about 1 mile east-northeastward.

Gristower Wiek, a shallow inlet about 4 miles south-southeastward of Stahlbrode, is fronted by extensive shoals. Riems, an island, lies in the entrance to the inlet. A buoyed channel, about 7 3/4 feet deep, leads from Stralsund dredged channel to the southern side of Riems. Submarine cables are laid from the island, southward to the mainland. The northwestern end of Koos Island (sec. 7B-10) lies about 3/4 mile eastward of Riems.

7B-11 BETWEEN KOOS AND USEDOM, about 13 miles eastward, the coast is indented by two shallow inlets. The intervening coast is unbroken, partly wooded, and steep in places. Shoals extend about 1 mile offshore to the 3-fathom curve.

Danische Wiek, the western inlet, is fronted by a coastal shoal extending northward to Palmer Ort lighted bell buoy (sec. 7B-10), and the 3-fathom curve. A lighted buoy, moored about 2 1/2 miles southeastward of Koos, marks the eastern edge of the shoal. The greater part of the inlet is about 1 1/2 to 2 3/4 fathoms deep. Northeasterly winds raise the water level about 3 1/4 feet; southwesterly winds lower it equally.

WEIK (54°06'N., 13°27'E.), a fishing village, is located at the southwestern side of the inlet, at the mouth of the Ryk River (sec. 7B-2). The harbor, formed by two moles extending into Danische Wiek, is about 13 feet deep. A dredged channel, about 14 3/4 feet deep, marked by buoys, leads southward from a lighted approach buoy moored 1 1/4 miles northward of the northern molehead. Range lights lead through the channel. A midchannel course leads between moleheads and through the harbor to a drawbridge spanning the river. Bridge signals are in force. Vessels can lie alongside about 2,700 feet of wharfage with 10 to 13 feet alongside between the bridge and root of the moleheads. A light is shown from the northern molehead. Storm signals are displayed from a mast in the harbor.

GREIFSWALD, a town with a university and several institutions, is located on the southern side of the Ryk River, about 2 1/2 miles from its mouth. The harbor, formed by the sides of the river, is about 3/4-mile long and 13 to 14 feet deep. About 3,700 feet of quayage with 10 to 13 feet alongside, line the harbor. Inland waterways vessels can proceed from Wiek in 13 feet, steering a midchannel course in the river. A speed of 4 knots is permitted. Cables span and are laid across the harbor entrance. The quays are served by the railroad. Minor repairs are made at a shipyard with a marine railway.

Usedom, an island lying close eastward of the mainland at the southern entrance of Greifswalder Bodden (sec. 7B-1), forms the eastern side of the Peene River. Peenemunder

Haken and Freesendorfer Haken are coastal shoals (sec. 7B-3), extending northward from Usedom and a peninsula about 1 1/2 miles westward, respectively. Lights are shown from the northern sides of the shoals. Freesendorfer Haken is steep to on the northern side. A prohibited area, about 1 mile square, extends off the northeastern corner of Usedom.

7B-12 PEENE RIVER (54°08'N., 13°45'E.), the western branch of the mouth of the Oder (Odra) River, is about 29 miles long between its mouth and Kleineshaff, an inland sea. This shallow river, together with Kleines Haff and Wielki Zalew (Groszes Haff), adjoining sea, is the western approach to the ports of Swinoujscie and Szczecin. From its mouth close westward of Usedom the river follows a tortuous course forming several large bays, of which Achterwasser is the largest. Shoals, filling the river mouth and approaches, extend to Loch and Osttief (sec. 7B-8). A dumping ground lies on the shoals close northwestward of Usedom.

Ice forms in the river and entrance earlier than in the entrance of Greifswalder Bodden. The strong current frees the river sooner than the bay. Strong northwesterly winds carry ice from the bay into the river.

Currents rarely exceed a velocity of 2 1/2 knots. With southeasterly to westerly winds the current sets into the bay; with easterly to northwesterly winds the set is into Wielki Zalew.

Channels are dredged across the shoals in the river approaches and in the various reaches of the Peene. Tonnenbank Channel, 16 1/4 feet deep, leads from the Loch fairway (sec. 7B-8), close southward of Der Ruden (sec. 7B-4), across Tonnenbank Shoal to the river entrance. Lighted and unlighted buoys mark the sides of the channel. Lights in range, 206 1/2°, at Freest (54°08'N., 13°44'E.), lead through the channel. A secondary, dredged and buoyed channel, 8 1/4 feet deep, leads from the western end of Loch across the shoals to a junction with the main channel. Range lights, 333°, lead through this channel. From the entrance the dredged channel to Wolgast is 16 1/4 feet deep, narrow, and often difficult due to vessels maneuvering near the fairway. In 1963, vessels

with a draft of 12 1/2 feet could proceed in the channel between Peenemunde and Wolgast. Lighted beacons and buoys, marked according to the International Uniform System, and range lights, mark the channel.

PEENEMUNDE (54°08'N., 13°46'E.), on the eastern side of the river, is a naval base with two small harbors closed to shipping. Storm signals are hoisted on a mast at the narrows northeastward of the harbor.

Kroslin, a fishing harbor on the western side of the river southward of Peenemunde, is approached through a buoyed channel available to vessels with a draft of 11 1/2 feet, leading to a landing with about 6 1/2 feet alongside.

Karlshagen, a fishing harbor about 13 feet deep, is located about 2 miles southeastward of Peenemunde.

WOLGAST (54°03'N., 13°47'E.)

7B-13 Wolgast is a sheltered river port located on the western side of the Peene River, about 6 miles above the entrance. A naval supply depot and shipyard are important features of the port. Coastal and inland waterways vessels enter the harbor.

NAVIGATION.—See sections 7B-5 and 7B-8.

WINDS—WATER LEVEL.—The harbor is protected from all winds. The water level is irregular, being influenced by the level in Greifswalder Bodden and Wielki Zalew.

ICE.—See section 7B-12. Ice closes the port from 1 week to 5 weeks, depending on severity of the winter.

CURRENTS.—See section 7B-12.

DEPTHS—DANGERS.—The harbor is 16 feet deep, subject to silting. Submarine cables are laid across the river from the outer harbor to the railroad ferry landing and the bridge landing on the opposite shore. Beacons mark the landings.

HARBOR.—The harbor, extending along the river front for about 2 miles, has 2 basins and numerous wharfs. The commercial area is divided into an inner and outer harbor by a bridge connecting the mainland to an island lying close offshore. There is about 16 feet fronting the island and 7 to 15 feet in the harbors. A highway bridge, with an opening about 59 feet wide, spans the river between the island and the eastern shore. Bridge signals are in force. A railroad cable ferry

crosses the river close southward of the drawbridge. Shipyard basins, lined with quays, indent the shore southward of the commercial harbor. There is about 8 to 32 feet in the basins.

PILOTS.—Pilotage is compulsory. Pilots can be obtained from the pilot station in Thiessow, Stralsund, or from Der Ruden (sec. 7B-4, 7B-8).

ANCHORAGE.—The limited scope of the channel prevents anchoring. There is ample swinging room in 4 1/2 fathoms in Greifswalder Bay, good holding ground.

DIRECTIONS.—See section 7B-8. From a position in Loch Channel, close southward of Der Ruden, steer for the Tonnenbank Channel (sec. 7B-12), marked by lighted buoy "A" at the entrance, and available to vessels with a draft of 14 3/4 feet. Steer 206 1/2° on the range alignment through the buoyed channel for about 2 miles. Thence steer various courses between the buoys marking channel reaches to port.

7B-14 WOLGAST, with about 12,000 inhabitants, has a harbor mainly adaptable to barge traffic. It is a first port of entry.

BERTHS.—There is about 7,900 feet of wharfage in port, including the shipyard basins. The outer harbor has about 2,600 feet of berthing served by the railroad. Vessels about 328 feet long with a draft of 13 feet can berth alongside. Several cranes with a capacity of 3 tons are available. There are several berths with 7 to 11 feet alongside.

SUPPLIES.—Water is available at most berths. Limited quantities of fuel and diesel oil and provisions are procurable.

REPAIRS.—The shipyard has berths with 8 to 32 feet alongside. There are two shipbuilding ways, a marine railway with a capacity of 1,500 tons, and a hydraulic ship lift of 2,000 tons capacity. Several cranes with a maximum capacity of 20 tons are available.

COMMUNICATIONS.—The town has railroad and highway connections with Usedom, Rugen, and throughout East Germany.

MEDICAL.—There are hospitals in town.

PEENE RIVER (Continued)

7B-15 South of Wolgast the fairway is indicated by 5 pairs of lighted range beacons, the position of which are best seen on the

chart. The dredged channel to Kleines Haff (7B-12), about 8 feet deep but subject to silting, is marked by buoys. The fairway generally leads in the middle of the river. Vessels with a draft of 6 1/2 feet are accommodated.

From the end of a peninsula about 2 miles southward of Wolgast, the river turns south-eastward for about 8 miles to Moderort, a buoyed channel. It then leads southwestward for about 5 miles, passing westward of the southwestern end of Usedom Island. A bascule highway bridge crosses the river between Usedom and the mainland. A railroad bridge crosses the river about 1 1/2 miles south-eastward of the road bridge.

KARNIN (53°51'N., 13°52'E.), a village with a harbor basin about 5 1/2 feet deep, is located on Usedom about 1/2-mile southeastward of the railroad bridge. A submarine cable crosses the river at Karnin. Pilots for the Peene and river ports can be obtained at the harbor. A light and storm signals are shown at the pilot station. A dredged channel about 11 1/2 feet deep, marked by buoys and range lights, leads from the river southward of Karnin into Kleines Haff. Vessels with a draft of 8 feet are permitted in the passage through the bridge opening.

ANKLAM (53°52'N., 13°40'E.), the principal port between Wolgast and Kleines Haff, is located on a branch of the Peene River about 5 miles westward of the highway bridge. The branch, about 10 feet deep, leads to a wharf 1,100 feet long with 10 feet alongside.

ANCHORAGES

7B-16 GREIFSWALDER OIE.—Anchorage, sheltered from westerly and northwesterly winds, can be taken between Greifswalder Oie and the mainland about 11 miles southward.

DER RUDEN.—Anchorage, sheltered from offshore winds, can be taken in 3 3/4 to 4 1/2 fathoms, mud, about 1/4-mile eastward of the southern part of Der Ruden sand spit. Anchorage can also be taken in 4 to 5 fathoms about 3 miles eastward of the northern part of Der Ruden.

ZICKERER SEE.—Anchorage can be taken in 4 to 5 fathoms about 2 miles southwestward of Zickerer See.

LAUTERBACH.—Anchorage can be taken in 3 1/2 fathoms about 1/2 mile off the western molehead.

DANISCHE WIEK.—Anchorage can be taken in 2 3/4 fathoms, good holding ground, about 1 1/4 miles northward of the northern molehead.

GREIFSWALDER BODDEN.—Anchorage can be taken in 4 to 4 1/2 fathoms throughout the bay, clear of dangers.

PART C. POMERANIAN BAY, INCLUDING SWINUJSCIE AND SZCZECIN

7C-1 ZATOKA POMORSKA, commonly called Pomeranian Bay, bound southwestward by Usedom Island and southeastward by Wolin Island, is formed by a broad indentation of the coast. The bay lies between the northern end of Usedom and the entrance of Rzeka Dziwna, a river about 33 miles east-southeastward. Offlying banks in the outer bay are described in section 7A-3. Numerous wrecks throughout the bay are best seen on the chart.

COAST—GENERAL

7C-2 The shores of the bay are virtually unindented and almost entirely wooded. The terrain is lower in the southern part. Landmarks, consisting of local churches and a few, steep cliffs, are described with related features. In places along the coast of Usedom only a narrow ridge of land, protected by dikes, separates the Baltic from lakes formed by the backwaters of the Peene River.

DEPTHS—DANGERS

7C-3 Zatoka Pomorska is about 7 to 8 fathoms deep, decreasing gradually toward the head of the bay. The 5-fathom curve parallels the coast about 1 mile to 2 miles offshore. Between the mouth of the Dziwna (54°01'N., 14°44'E.), and Swieta Kepa, a cape about 9 miles west-southwestward, the 5-fathom curve lies 5 to 6 miles offshore. Numerous foul patches of 5 to 6 fathoms lie close to fairways.

Prohibited areas extend about 2 miles offshore between the head of the bay and the Dziwna entrance. The approaches to ports in the bay lead through previously mined areas extending offshore to Odrzana Lawica (sec.

7A-3), and considered dangerous to navigation. Consult the chart.

NAVIGATION

7C-4 See section 7B-5. NEMEDRI swept channels, marked by lighted buoys, lead through danger areas to ports at the head of the bay. From 54°14'N., 14°04'E., a south-southeasterly course for about 15 miles leads in 36 1/2 feet to the anchorage area off the port of Swinoujscie. From "SWI-1" Lighted Bell Buoy, with a radar reflector, moored about 13 miles north-northeastward of the Dziwna entrance, a course of about 242° leads between lighted buoys in a least depth of 36 feet to the anchorage.

CURRENTS

7C-5 The current in the bay sets with the prevailing winds. An easterly set predominates. The current attains a velocity of about 2 knots along the coast and is strongest about 4 miles offshore.

ICE

7C-6 During severe winters, when northeasterly winds predominate, the bay is filled with floating ice which forms ice fields extending several miles seaward in prolonged freezing weather. Much of this ice comes from the rivers and Greifswalder Bodden (sec. 7B-7). See Appendix for additional information.

COASTAL FEATURES—LANDMARKS

7C-7 BETWEEN USEDOM (54°11'N., 13°48'E.) AND SWINOUJSCIE, about 23 miles southeastward, the coast is low and wooded for about 7 miles, thence becomes hilly with occasional steep cliffs. The coastal fringing shoal, of less than 3 fathoms, extends about 3 miles off the northern end of Usedom to Usedomer Steintrendel, 3-fathom patches. Southward, the coast is fronted by a narrow fringe of shoals, foul in places, and rocky off Streckelsberg, a steep-to and wooded height, about 11 miles from Usedom. Obstruction lights are shown from a mast near the summit. Storm signals are hoisted near Streckelsberg. Rocky patches of 1 1/2 and 2 1/2 fathoms lie up to 2 miles offshore between Streckelsberg and Zinnowitz, a summer resort about 4 miles northwestward.

Heringsdorf (53°58'N., 14°11'E.), is a summer resort about 7 1/2 miles southeastward of Streckelsberg. A breakwater extends offshore close northward. Ahlbeck, a summer resort, adjoins Heringsdorf. Storm signals are hoisted at Ahlbeck. The coast southeastward of the resort is protected by a high dike. Two pyramidal beacons standing about 1 1/2 miles southeastward of Ahlbeck indicate the boundary line recognized by East Germany and Poland.

Landmarks prominent along this stretch of coast are the churches at Zinnowitz and Ahlbeck. The former has two conspicuous towers rising above the trees; the latter, closer to the coast and more elevated, has a long red roof.

SWINOUJSCIE (SWINEMUNDE) (53°55'N., 14°16'E.)

7C-8 Swinoujscie, the outport for Szczecin, is situated at the mouth of the Rzeka Swina. Originally a lightening-up port for Szczecin or harbor of refuge and coaling station, it is rapidly developing into a major port. Extensive transshipping is carried out. It is an important naval base and the headquarters for a deep-sea fishing combine with extensive facilities.

NAVIGATION.—See section 7A-4 and 7C-4. NEMEDRI should be followed in the approaches to Swinoujscie.

WINDS—WEATHER.—See section 7-3. On-shore winds raise a sea at the roadstead off the port, particularly strong southeasterly winds.

ICE.—See section 7C-6. The mouth of the Swina is generally free of ice even though there is floating ice upstream or in the roadstead. Icebreakers keep the port open.

CURRENTS—WATER LEVEL.—Current velocity depends on wind force. Off the entrance to port, easterly and westerly winds cause a set with the wind, across the entrance. Light winds from any direction cause an out-going current between the breakwaters. Strong northerly and northwesterly winds cause an incoming current, which may attain a velocity of 4 knots during heavy rainfall or after a calm.

The water level may rise or fall about 2 feet from the mean level. Northeasterly storms raise the level about 6 1/2 feet,

while southerly storms lower the level about 3 1/4 feet below the mean. These maximum fluctuations are uncommon.

DEPTHS—DANGERS.—Swidna Zatoka, the roadstead extending about 6 miles northward of Swinjouscie, is 5 to 6 fathoms deep. The approach channels (sec.7C-4), lead in at least 36 feet to an anchorage in the roads. Numerous wrecks and foul patches, best seen on the chart, lie in and close-to the channels.

The approach channel, about 216 yards wide and at least 36 feet deep, leads from the anchorage to the head of the eastern breakwater. There is about 31 feet in the entrance 200 yards northwestward of the breakwater head. An obstruction lies about 3 1/2 miles east-northeastward, and two wrecks with about 5-fathoms over them lie 1 mile northeastward and 4 miles northward of the outer breakwater head. The latter is marked by a lighted buoy. A lighted buoy marks a dumping ground in 53°59'N., 14°21'E.

Mielizna Zachodnia, a shoal 1 fathom to 3 fathoms deep, extends about 1 mile offshore to the western side of the entrance channel. Buoys mark the channel edge of the shoal. A short western breakwater, extending offshore, stands on the southeastern side of the shoal which partly dries eastward of the breakwater.

The coastal shoal on the eastern side of the entrance channel is less than 2 1/4 fathoms deep, extending offshore about 3/4 mile to the head of the eastern breakwater.

A prohibited area extends about 2 miles offshore along the coast on each side of the entrance channel. Anchoring is prohibited in a cable area charted about 1 mile northward of the eastern breakwater head.

CAUTION.—It was reported (1962) that a net attached to buoys was laid across the channel near the root of the eastern breakwater to a naval restricted area directly opposite. The net is opened during daylight hours.

LANDMARKS.—In clear weather, Swinoujskie Lighthouse and a nearby radio mast are conspicuous from the offing, as are church spires about 1 1/4 miles westward of the light tower, Lubin Church, about 6 miles southeastward of the lighthouse, and a saddle-shaped hill (53°53'N., 14°12'E.), are prominent.

7C-9 HARBOR.—The harbor, from the sheltered entrance formed by the two concrete breakwaters, extends from the mouth of the Dziwna (Swina), the central mouth of the Odra river, inland along the Swina about 2 3/4 miles. The river then divides into two branches. Mielinski Kanal, the western branch, is the main ship channel. The eastern branch is a continuation of the Swina. Eight artificial basins lie along the sides of the river. Traffic signals (sec.7C-18) are in force.

Vessels with a least draft of 31 feet can enter the harbor through a buoyed entrance channel, 330-feet wide, leading between the breakwaters about 1,150 feet apart. The fairway through the harbor is about 490 feet wide and 32 to 50 feet deep in midchannel. Mielinski Kanal, as it constitutes the harbor, is 600 to 700 feet wide and 32 feet deep in the fairway. Silting is constant, requiring continual dredging.

Basen Stoezniowy (Bauhafen), entered about 1/4 mile southward of the restricted naval area adjoining the root of the western breakwater, is about 1/3 mile long and 7 to 16 feet deep. It is used for naval repair berthing and military cargo. A shipyard is located close southward. Railroad Quay, used for general cargo and the open storage of coal and ores, fronts the basin. A tide gage, lighted at night and showing a reading of 1.04 meters at mean level, stands in the river opposite the shipyard. A passenger ferry crosses the river nearby. Several submarine cables are laid in the area. Notice boards mark the landings.

Kosa, a peninsula about 2/3 mile long, formerly called Eichstaden Island, fronts two basins entered about 1/3 mile southwestward of the Railroad Quay. A light is shown from the northeastern side of Kosa. Basen Weglowy (Coal Harbor), the outer basin is about 1/2 mile long and 10 to 27 feet deep. It is used for general and bulk cargo. Coal and ores are stored on Kosa. Basen Zimowy (Winterhaven), the inner basin, is about 1/2 mile long and 8 to 18 feet deep. There is a fish quay at the head of the basin. Naval vessels berth at the quays in both basins. The Old Seaplane Basin, at the southern end of Kosa, is used for naval berthing in 8 to 14 feet.

Basen Chorzeln, about 1/3 mile southward of the eastern breakwater root, is a naval basin 500 feet long and 8 to 13 feet deep. Basen Werszow and the Boat Harbor, about 1/2 mile apart, with the latter located opposite the northern end of Kosa, are 8 to 10 feet deep, respectively. The former is used by naval craft.

Basen Odra (53°54'N., 14°16'E.), opposite the Old Seaplane Basin, is used for berthing fishing vessels. It is about 1/4 mile long and 26 feet deep. Quays front a shipyard southeastward of the basin.

A passenger and car ferry crosses the river above the boat harbor. There are numerous mooring buoys, about 500 feet apart, between the Boat Harbor and Odra Basin. Vessels with explosives are assigned fixed berths in 18 to 20 feet at the buoys.

Special Harbor Regulations are in force. Copies are obtained at the office of the harbor master, located near the root of Railroad Quay, or from the boarding party at the anchorage.

AIDS TO NAVIGATION.—Lights in range, 170 1/2°, are shown from the head and near the root of the western breakwater. There is a traffic signal station at the rear beacon. A light is shown from the head of the eastern breakwater. A fog signal is sounded at the light. Lights in range, 146°, are shown about 1/4 mile northward of the breakwater root and 1/2 mile inland. Swinoujscie Light (53°55'N., 14°17'E.), is shown about 1/4 mile southward of the eastern breakwater. A radiobeacon transmits at the light tower. Another radiobeacon calibrates R.D.F.'s on request. Lighted Beacon No. 3, aligned 144° 30' with No. 2 Lighted Beacon, marks the western edge of the fairway. Lights in range, 190°, are shown about 1/4 and 1/2 mile southward of Swinoujscie Light. Lights in range, 239° and 298° mark two ranges. The front lights of each range are shown from the center and southern ends of Kosa, respectively. The rear range light, shown close westward of the Old Seaplane Basin, is common to both ranges.

There are various charted lights and buoys marking ferry landings, pierheads and quays, basin entrances, and fringing shoals along the eastern side of the river. Buoys may be moved occasionally to meet changing conditions.

Swinoujscie Approach Channel Lighted Buoy "1", with a radar reflector, is moored about 2 miles north-northwestward of the eastern breakwater.

7C-10 PILOTS.—Pilotage is compulsory. Pilots can be obtained on arrival at the anchorage in the roadstead. If a pilot is not on hand, anchor, and send a message to ship's agent. Vessels must be identified through "call letters" and by Morse Code with the signal station (sec. 7C-9). The Pilot Harbor is located at a small basin on the western side of the entrance opposite Swinoujscie Light. The pilot station is at the root of Railroad Quay.

ANCHORAGE.—Anchorage can be taken in 5 to 7 fathoms, hard sand and clay, in an area marked by buoys, lying 2 to 6 miles northward of the breakwaters. The anchorage is exposed to strong northerly winds. Fresh southeasterly winds cause a rough sea.

DIRECTIONS.—See section 7C-4. From Swinoujscie Lighted Whistle Buoy (54°00'N., 14°15'E.), moored about 2 miles from the approach channel, marked by lighted buoys, steer 170°30' on the entrance range until abreast the eastern breakwater head. Thence steer on the charted range described previously in Aids to Navigation. The ranges lead in the fairway of the river to Kosa (sec. 7C-9). From the southern end of Kosa steer on the 298° range, astern, for Basen Odra fishing port entrance and the adjacent shipyard.

7C-11 SWINOUJSCIE, a city of about 25,000 inhabitants, is located on the western side of the river, at its mouth. It is a first port of entry. The suburbs of Chorzeln and Werszow, opposite Swinoujscie, are connected to the city by ferries. The port of Swinoujscie serves the inland river ports of Szczecin and Wolgast (sec. 7B-14) as a transshipment center. It is a bulk cargo port for raw fertilizer material, coal and ores.

BERTHS.—Quays line both sides of the river. Most of the commercial wharves are on the eastern side. Destroyer Quay, opposite Basen Stoesniowy, is about 2,400 feet long with 18 to 27 feet alongside. There is a berth 1,800 feet long. A coal depot at the northern end of the quay is being developed. Werszow

(Ostwine) Coal Pier, is an L-shaped pier about 630 feet long with 30 to 32 feet along the outer side. The inner side is 615 feet long with 12 feet alongside. A 10-ton crane is available for bulk ores. Ferry Quay, the eastern terminus for the river ferries, has two general cargo berths about 500 and 580 feet long with 13 to 20 feet alongside. South Ferry Quay, southward of the naval oil quay, is 350 feet long with 14 feet alongside. Odra fishing basin quays are 1,600, 1,150, and 525 feet long with 26 feet alongside. The south quay of the basin facing the river is 590 feet long with 26 feet alongside.

Klicz Pier, at the shipyard adjacent to the fishing basin, has two 650-foot berths. The outer berth has 20 to 30 feet alongside. Stocznia Rybacka, a ship repair quay nearby, is 250 feet long with 13 feet alongside. Wladyslawa IV Quay, on the western side of the river, opposite the northern end of Kosa, has three berths about 800, 740, and 320 feet long with 23 to 28 feet alongside. Polish Harbor Quay, has berths 575 and 450 feet long with 30 feet alongside. There are grain unloading facilities at this general cargo quay located northward of Basen Weglowy. Zimowy SW and SE Quays have berths 700 and 820 feet long with 8 to 13 feet alongside. A berth opposite the Polish Harbor Quay is 490 feet long with 13 feet alongside. There are a few 3 to 7 ton cranes on some quays, and a 100-ton floating crane at Basen Stoez-niowy. About 50% of the berths have rail connections. General cargo is often unloaded by ship's gear.

SUPPLIES.—Ships' stores and provisions are available in limited quantities. Water is piped to a few quays but can be obtained by water boat. Diesel oil is available at the fishing basin and two quays. There are harbor tugs.

REPAIRS.—Minor repairs to hull and machinery can be made. Three marine railways for fishing vessels are available. The naval shipyard has a floating dry dock with a lifting capacity of 1,000 tons.

COMMUNICATIONS.—Ferries carry passengers and cars between Swinoujscie and Ystad, Sweden. There are rail connections between stations near the ferry landings and Szczecin on the general railroad system. Vessels ply between the port and harbors on the inland waterways. There is a radio station.

DERATTING.—See section 1-9.

MEDICAL.—There is a hospital and outpatient clinic for civilians. A quarantine establishment is located at Chorzelin, southward of the basin. See section 1-100.

APPROACH TO SZCZECIN

7C-12 Szczecin is approached from Swinoujscie through a dredged channel about 37 miles long and 260 feet wide. Vessels with a draft of about 28 feet can transit the channel at any time, although port regulations are in effect regarding tonnage, draft, and type of vessel. The channel is 29 1/2 to 31 1/2 feet deep in various reaches but silting of the river fairway requires periodic dredging.

Buoys and lighted beacons, marked according to the Polish System of Buoyage, line the sides of the channel. Lighted ranges lead in the various fairways. Many of the buoys are removed during the ice season. Fog signals are sounded at the beacons. Changes in the channel may necessitate the shifting of buoys, beacons, and ranges. Anchoring is prohibited in the fairway. Icebreakers keep the channel free of ice.

Mielinski and Piastowski Kanals constitute the ship channel between Swinoujscie and Wielki Zalew (Groszes Haff), the inland sea formed by the outflow of the Odra River. This land cut through Uznam (Usedom) is spanned by a bridge at Paprotno Bend (53° 51'N., 14° 17'E.), the site of a ferry landing. Mielin Island forms the eastern side of Mielinski Kanal. The Stara (Alte) Swina, flowing eastward of the island, forms the southern side of Wolin.

Zalew Szczecinski (Stettiner Haff), an inland sea consisting of Kleines Haff (sec. 7B-12) and Wielki Zalew, is about 1 1/2 to 3 1/2 fathoms deep. The dredged channel from Piastowski Kanal to Roztoka Odrzanska (Papen Wasser), about 11 miles southeastward, is about 390 feet wide and 29 1/2 feet deep, subject to silting. Dangers near the channel are best seen on the chart. There are several secondary channels, marked by buoys, leading across Zalew Szczecinski to Wolgast (sec. 7B-13), and local harbors on the shores of this inland sea.

The water in Zalew Szczecinski is salty, especially in the northwestern part, becoming fresh in the area of Roztoka Odrzanska. Ice

forms earlier in the inland sea and channel than in the various reaches. During the ice period, averaging about 60 days, ships are accompanied by icebreakers and tugs, especially necessary in ice break-up when wind-driven ice can drive a ship onto the shoals. Vessels in transit should ascertain the latest local icebreaker signals. The water level in Zalew Szczeciński rises and falls about 1 1/2 feet, respectively, with northerly and southerly winds.

Chelminek (53°40'N., 14°32'E.), is an artificial island regulating current in the entrance of Rostoka Odrzanska. The approach channel to Szczecin leads in about 32 feet westward of Chelminek. Lights are shown at each end of the island. An obstruction, marked by a buoy, lies in the channel about 1 1/2 miles southeastward of the island. Secondary channels, marked by buoys, lead to Stepnica and Trzebiez, local ports at the eastern and northwestern sides of Rostoka Odrzanska.

The approach channel, leading about 4 miles southward of Mankow, a bend forming the southeastern shore of Rostoka Odrzanska, is about 31 feet deep and 345 feet wide, confined eastward of Wietki Karw Islands.

POLICE (53°33'N., 14°35'E.), approached through an inlet about 18 feet deep southward of the islands, has a large chemical plant for fertilizers built near a barge harbor at the head of the inlet.

The channel southward of Wietki Karw leads southeastward to Ina Peninsula, at the southern end of which Inski Nurt inlet gives access to Jezioro Dabie, a shoal inland sea. The Odra River channel from Ina to Mielenski Przekop, about 5 miles south-southwestward, is about 200 to 400 feet wide and 30 feet deep. Shoals of less than 4-fathoms lie close to the channel between Ina Peninsula and Police Inlet. Debina Island forms the eastern side of the Odra leading into Szczecin.

ANCHORAGES.—Anchorage can be taken in a turning area about 600 feet long and 5 fathoms deep at the junction of the Stara Swina and Piastowski Kanal.

Anchorage can be taken in 8 fathoms close westward of Chelminek and eastward of Wietki Karw fairway, respectively.

Anchorage can be taken in 4 to 4 1/2

fathoms in an area marked by buoys at the channel entrance to Inski Nurt, also in an inlet about 1 mile southward.

Outbound ships can anchor in 4 fathoms at the entrance to the fairway leading to Trzebiez.

SZCZECIN (STETTIN) (53°26'N., 14°34'E.)

7C-13 Szczecin, and important inland port, is situated about 37 miles from the Baltic on both sides of the Odra River. It is the principal maritime outlet for the Silesian industrial region of southwestern Poland. A vast quantity of bulk materials is shipped from the port, which is connected to the interior by the Odra and a system of inland waterways. Szczecin is a shipbuilding and ship repair center. A fishing fleet is based in the port.

NAVIGATION

7C-14 See sections 7A-4 and 7C-4.

WINDS—WEATHER

7C-15 Northwesterly to northeasterly winds and southwesterly to southeasterly winds, raise and lower, respectively, the water level in port about 5 feet between extreme levels.

ICE

7C-16 See section 7C-12 and Table 8 (Appendix). Special ice signals are in effect between Swinoujscie and Szczecin.

DEPTHS—DANGERS

7C-17 The Odra River leading into Szczecin is 18 to 31 feet deep, dredged in the ship channel to 31 feet, but subject to silting. Ships with a draft of 28 feet can enter the harbor to Wyspa Okretowa (53°27'N., 14°36'E.), where the river is divided. The main part of the Odra fronting the city is about 27 feet deep to the first bridge spanning the river. The Odra is closed to general shipping between the northern and southern limits of Okretowa.

Turning areas about 600 and 800 feet wide lie about 1 1/2 miles northward, and close southward of Okretowa, respectively. Ships can turn in an area 600 feet wide, 18 to 27 feet deep, in the river opposite Szczecin ship repair yard. A turning area about 850 feet wide and 31 feet deep lies at the southern extremity of Mielenski Przekop.

Mielenski Przekop, fronting the eastern side of Okretowa and the harbor, is about 3 miles long, 18 to 31 feet deep, with a channel 31 feet deep.

Maly Przekop, at the southeastern side of Okretowa, is about 1/2 mile long and 31 feet deep in the channel.

Grodzki Kanal, 2/3 mile long, with a channel 31 feet deep, leads from the Odra southward of Maly Przekop.

Debicki Kanal, 1/2 mile long, with a channel 29 to 31 feet deep, lies southward of Maly Przekop and eastward of Grodzki Kanal.

Dunczyca E., about 1 mile long and 16 to 29 feet deep, extends between the southeastern end of the Debicki Kanal and Mielenski Przekop. A western segment of Dunczyca has a channel 25 feet deep between the Odra and the Grodzki Kanal.

Parnicki Przekop, about 2 2/3 miles long and 18 to 29 feet deep, extends from the Odra to the southern end of Mielenski Przekop. Przemyslowy Kanal, 19 to 21 feet deep, leads northward from Parnicki to the Debicki Kanal.

Shoals at the confluence of canals and rivers are marked by buoys, as are several wrecks throughout the harbor. Submarine cable landings are marked by yellow notice boards. Warning lights are shown at the various turns, intersections and on dolphins. Local knowledge is necessary. There is a tide gage in the river near the harbor master's office.

HARBOR

7C-18 The natural, sheltered harbor of Szczecin, suitable for maritime traffic, consists of about a 5-mile stretch of the Odra and an adjoining network of waterways, 16 to 31 feet deep.

The northern harbor consists of a 3 1/2-mile stretch of the Odra extending from Glinki, a suburb, to Wyspa Gryfia adjoining Okretowa. The southern harbor consists of several basins lying southward of Parnicki Przekop. Most bulk cargo wharves are in the northern and southern harbors. The central harbor consists of waterways and basins lying between the Odra, Mielenski Przekop, and Parnicki Przekop. Grain, oils and general cargo, are handled in the central harbor.

Railroad and vehicular bridges connect the mainland at Szczecin with harbor islands. Ferries ply between the shipyards and the mainland. Lights mark the bridge spans and landings. Oceangoing ships berth downstream of the bridges.

Basen Gorniczny, about 1,550 feet long and 18 to 31 feet deep, lies at the junction of Mielenski Przekop and Parnicki Przekop. Breasting dolphins, with 31 feet alongside, at the northeastern side of the basin are used for fixed mooring berths.

Regaliczka Basen, 750 feet long and 28 to 30 feet deep, leads southwestward from Gorniczny Basen.

Kaszubski Basen, 1,800 feet long and 22 to 29 feet deep, is the southern extension of Gorniczny.

Gornoslaski Basen, 3,000 feet long and 18 to 28 feet deep, leads westward of Regaliczka Basen. Notecki and Warta Basens extend southwestward from Gornoslaski. The former is about 1,000 feet long and 18 to 20 feet deep; the latter, 1,450 feet long and 18 to 25 feet deep.

Zachodni and Wschodni Basens lie on the western and eastern sides, respectively, of a pier approached through Grodzki Kanal. The former is about 2,200 feet long and 20 to 31 feet deep; the latter, 2,100 feet long and 22 to 31 feet deep. Sledziowy Basen, at the northern entrance of Przemyslowy Kanal, is 1,150 feet long and 12 to 24 feet deep. There is a turning area, about 620 feet wide and 25 to 31 feet deep, at the junction of Zachodni and Wschodni Basens. Ships can turn off Sledziowy Basen in an area 550 feet wide and 18 to 21 feet deep.

Przekop Brodowski, a basin at the northern end of Wyspa Gryfia used for ship repairs, is 1,200 feet long and about 21 to 26 feet deep. Two floating drydocks occupy the eastern end of the basin. Szczecin Repair Yard, occupying all of Wyspa Gryfia, performs all types of ship repairs. Szczecin Shipyard, on the mainland opposite the repair yard, is capable of building ships of 25,000 d.w.t.

Fixed berths are available in 23 feet for about 1/2 mile at dolphins along the western side of Grodzka Kepa, an island in the Odra at the Grodzki Kanal entrance. There are several oil berths along the southern side of Parnicki Przekop.

TRAFFIC SIGNALS.—Three black balls vertical, by day, and three red lights shown vertically at night from the rear range beacon (sec.7C-9), indicates entry into port is absolutely prohibited. Normally, entry into port is prohibited when a cone between two black balls and a white light between two red lights are similarly hoisted at the same location. Departure from port is prohibited when three cones are displayed, vertical, the upper and lower pointing down. At night, a white light is shown between two green lights, vertical. Entry and departure are prohibited when two cones, point to point, are displayed above a ball; at night, a green and a red light, respectively, are shown above and below a white light.

REGULATIONS.—Approach and harbor regulations are in force for Szczecin. A long blast should be sounded approaching bends. Ships with a draft over 18 feet must not exceed a speed of 5 or 8 knots in various parts of the channel and 3 to 5 knots in the harbor. Overtaking vessels must not pass if their draft exceeds 18 feet. Tankers cannot overtake or be overtaken by other ships. Fireboats accompany tankers at all times between entering and a seaward departure. Ships must have a tug in attendance while underway, if over 375 feet long or over 10,000 d.w.t., two tugs must be employed. Numerous lighting and safety precautions are enforced in port.

AIDS TO NAVIGATION

7C-19 See section 7C-9. Channels are marked according to the Polish Buoyage System (sec.1-39). Important bends in the channel are marked by light sectors.

Lights in range, 139 1/2°, shown on framework masts standing on the western shore of Mielin Island (53°53'N., 14°17'E.), lead through Mielinowski Kanal.

Lights in range, 168°, shown on framework masts at Paprotno Bend, near the western landing of a bridge (sec.7C-12), lead to the northern entrance of Kanal Piastowski.

Lights in range, 322°, astern, shown on towers northwestward of Paprotno Bend, lead through Kanal Piastowski and the channel across Zalew Szczeciński (sec. 7C-12).

Lights in range, 142°, at Mankow (Gnage-

land) lead in the channel through the southern part of Zalew Szczeciński and into Rostoka Odrzanska (sec.7C-12).

Lights in range, 348°-168°, shown on beacons in the center of Rostoka Odrzanska and at Radun (53°34'N., 14°36'E.), respectively, lead to the Odra. Various short reaches of the river channel leading from Radun to Szczecin are marked by lighted range beacons and buoys, best seen on the chart.

PILOTS

7C-20 See section 7C-10. International Pilot Signals are in force. Pilot information and berthing instructions are transmitted by radiotelephone. If weather conditions prevent the pilot boarding in the roadstead, the signal "JT" is made by flag or light at the pilot boat. The ship will then follow astern to a safe boarding place. Ships reporting infectious disease to the pilot will anchor in an area designated until Pratique has been granted, or proceed into port on orders of the health inspector.

ANCHORAGE

7C-21 See section 7C-10. There are no free-swinging berths in Szczecin Harbor. Section 7C-18 describes fixed mooring berths.

DIRECTIONS

7C-22 See section 7C-10. The various Aids to Navigation (sec. 7C-19), lead from Swinoujscie to Szczecin. Local knowledge is necessary.

FACILITIES

7C-23 SZCZECIN (STETTIN), an industrial and manufacturing city situated adjacent to the port, has a population of about 315,000. The port, wholly administered by the Polish Ministry of Shipping through the Szczecin Port Authority, is a port of entry. Szczecin serves as a shipping center for transit cargo destined to and from E. Germany, Czechoslovakia, Hungary, and Austria. There are large cement, soap, food, chemical, and shipbuilding industries. Various ores, coal, lumber, and grain are handled in volume.

BERTHS.—At Glinki (53°30'N., 14°37'E.), in the northern part of the harbor, are ore, phosphate, and cement quays. Kra, the ore

quay, is 1,290 feet long with 18 to 22 feet alongside. The other two quays are 420 and 1,430 feet long with 15 and 13 feet alongside, respectively. TBT, a quay 1,050 feet long with 20 feet alongside is located on the mainland opposite Okretowa. It is a base for tugs and floating cranes. Southward of TBT are Vulcan and other shipyard fitting-out quays. Vulcan is 510 feet long with 22 to 26 feet alongside. The other quays are 300 to 500 feet long with 22 to 26 feet alongside. The main fitting-out quay at Szczecin Shipyard, on the mainland opposite the southern extremity of Wyspa Gryfia, is 1,400 feet long with 23 feet alongside. Gdynskie Quays are ship repair quays about 1,675 and 1,120 feet long, with 28 and 21 to 26 feet alongside, respectively. Floating dry docks are berthed at these quays at Wyspa Gryfia. Guleznien-skie Quay, facing the western side of Gryfia, is 2,850 feet long with 18 to 21 feet alongside.

Passenger Quay, facing the Odra opposite Grodzka Kepa dolphins, is 3,725 feet long with 21 to 23 feet alongside. It is used by river craft.

Starowka Quay, facing the Dunczyca opposite the southeastern side of Grodzka Kepa, is a passenger and general cargo quay about 2,690 feet long with at least 21-25 feet alongside.

Grodzki Kanal, terminating southward in Zachodni and Wschodni Basens, is lined with quays used for general cargo. The quays are 1,110 to 3,900 feet long with 20 to 29 feet alongside. Ewa a grain quay opposite the main fitting-out quay of Szczecin Shipyard, is about 660 feet long with 29 feet alongside. Grain is unloaded by conveyors to a granary which is the tallest building in Szczecin.

Czechoslovakian Quay, facing the western side of Debicki Kanal, is a passenger and general cargo quay 3,350 feet long with 29 to 31 feet alongside. Herring Quay, in Sledziowy Basen, is an explosives-handling quay 840 feet long with 24 feet alongside.

The southern side of Parnicki Przekop is faced by quays with about 23 feet alongside and T-headed piers. The latter, CPN Piers 1 to 4, are oil, tallow, and bunkering piers about 250 to 375 feet long with 22 to 26 feet alongside. Drzewny Quay, 1,950 feet long with 18 feet alongside, located westward of

the oil piers, fronts a ship-repair yard. Pig iron and lumber quays with 19 to 28 feet alongside lie opposite the repair yard.

The industrial basins close southward and eastward of Parnicki Przekop are lined with quays 600 to 950 feet long with 23 to 29 feet alongside. Katowice Quay, a bulk cargo quay 1,200 feet long with 30 to 32 feet alongside, fronts the eastern side of Basen Gorniczny.

There are numerous harbor tugs available and several deep-sea and salvage tugs. Numerous cranes of various types with capacities of 1 ton to 100 tons are located on the quays. Eight floating cranes of 7 to 100 tons capacity serve the port. All of the more important quays have rail connections.

SUPPLIES.—Meats and provisions are plentiful. Fuel and diesel oils are available, on advance notice, at some oil piers and by barge. Water is piped to many of the quays and can be obtained by water boat.

REPAIRS.—Major hull and engine repairs can be made. There are several floating dry-docks for repair work, the largest with a lifting capacity of 8,200 tons is about 510 feet long, 85 feet wide, with 24 1/2 feet over the sill.

COMMUNICATIONS.—The port is linked by railroad with E. Germany and throughout Poland. World-wide shipping connections are available. About 1,000 miles of navigable canals and rivers connect the port with the interior by barges. There is an airport nearby.

DERATTING.—See section 1-9.

MEDICAL.—Sanitary conditions are fair. There are several hospitals in the city.

COASTAL FEATURES—LANDMARKS (Continued)

7C-24 The coast of Wolin Island, extending east-northeastward between Swinoujscie and the Dziwna river entrance is unbroken, sandy, and wooded. Offshore waters and dangers are described in section 7C-3.

Miedzyzdroje (53°56'N., 14°27'E.), a summer resort on the coast about 6 miles eastward of Swinoujscie, has a red church tower which is prominent from the offing. A passenger pier at the town will accommodate vessels with a draft of 6 1/2 feet.

Lubin, a local port about 3 1/2 miles southward of Miedzyzdroje, lies in the north-

eastern part of Wielki Zalew (sec. 7C-12). The port has cement factories approached through a buoyed channel about 2,600 feet long and 8 1/4 feet deep.

Wolin, a fishing harbor on the western side of the Dziwna, is located near the southeastern end of Wolin Island, about 7 miles from Lubin. Two drawbridges for railroad and vehicular traffic span the river between Wolin and the mainland. A wharf, at least 500 feet long with 10 to 13 feet alongside, fronts the town. A fairway about 16 1/2 feet deep leads to the wharf. Wrecks, marked by buoys, lie near the fairway in the approach to the bridges. Range lights, shown on the island and mainland southward of town, lead in the fairway to the wharf.

The coast northeastward of Miedzyzdroje consists of steep sand dunes leading to Swieta Kepa (Swinholt), a high, sandy wooded cape about 3 miles distant. Prominent landmarks in the area include a watch tower about 190-feet high in (53°56'N., 14°31'E.); Kikut Lighthouse, about 3 miles northeastward of the cape; and a church about 1 1/2 miles southeastward of the light house.

PART D. RZEKA DZIWINA (DIEVENOW RIVER) TO ROZEWIE (RIKHOF)

7D-1 RZEKA DZIWINA (54°01'N., 14°44'E.), at its mouth, lies about 9 miles from Swieta Kepa and 17 miles from Swinoujście. This eastern branch of the Odra fronts the eastern side of Wolin Island from Zatocka Skoszewska, the easternmost part of Zalew Szczeciński (sec. 7C-12), to the Baltic. The river channel is about 180 feet wide and 10 1/2 to 12 feet deep from Zatocka Skoszewska to Zalew Kamiński, a bay close southward of the river entrance. A dredged channel, about 8 1/4 feet deep and marked by buoys, leads along the eastern side of the bay to Dziwnow Gorny, a summer resort about 1 1/4 miles inside the entrance. The channel is subject to change and silts to 6 1/2 feet. A church at the resort is prominent.

Dziwnow, a fishing harbor, lies on the southern side of the river entrance. Two breakwaters form the mouth of the river. The river, about 10 feet deep between the breakwaters, leads to the fishing harbor, 10 to 13 1/2 feet deep. Wharves in the harbor

have 10 feet alongside. A bridge spans the river eastward of the harbor.

Lights are shown from the head of the breakwaters. A fog signal is sounded at the light on the eastern breakwater. Range lights, 142 1/2', shown at the root of the western breakwater, lead between the breakwaters from lighted bell buoy "DZI", moored about 2 1/2 miles northwestward of the river mouth. A 1 1/4-fathom patch lies in the approach about 1/4 mile from the entrance.

COAST—GENERAL

7D-2 The coast between the Dziwna and Rozewie, about 136 miles distant, is uniform and consists of sand dunes which are quite high in the eastern part. Beyond the dunes are numerous coastal lakes, connected to the Baltic by shallow rivers. About midway along this coast are several wooded hills serving as landmarks. The highest are Rowokol and Gologora, about 400 and 500 feet high, respectively. Several lighthouses and churches, described with related features, are also prominent.

DEPTHS—DANGERS

7D-3 Depths increase gradually along this coast, with the 5 and 10 fathom curves lying about 1 mile and 3 miles offshore except at river outlets. There are numerous sunken wrecks and foul patches, best seen on the chart, lying inside the 10-fathom curve.

Slupska Lawica (sec. 7A-3), an off-lying bank, lies off this coast.

Danger areas, some charted, exist along this coast. Mines may be present in the areas extending about 7 miles northward of the Dziwna (sec. 7D-1), and in a charted area lying in the easterly approaches to the Swinoujście swept channel (sec. 7C-4). A similar area extends about 9 miles northward of Kolobrzeg (sec. 7D-7). Gunfiring practice is conducted offshore between the Dziwna and Kolobrzeg in an area extending from close southward of the Swinoujście swept channel to about 12 miles off Kolobrzeg. There is an explosives dumping ground about 25 miles northward of Kolobrzeg.

NAVIGATION

7D-4 From a position on the track about 20 miles eastward of Kap Arkona (sec. 7-2), a

course of 263° for 151 miles leads over a least depth of 10 fathoms, closing the coast about 5 miles off Rozewie. A departure from the track is necessary to reach local ports, especially Swinoujscie via the swept channel (sec.7C-4). Radiobeacons transmitting at Swinoujscie and Kolobrzeg assist in obtaining a "fix" in thick weather.

CURRENTS

7D-5 See section 7-4. Onshore winds can cause a considerable current. Vessels up to 6 miles offshore, steering courses parallel to the coast, have encountered a southerly set.

COASTAL FEATURES—LANDMARKS

7D-6 BETWEEN RZEKA DZIWNA AND KOLOBRZEG, about 31 miles east-northeastward, the coast consists of steep sand dunes backed by woods in many places. Niechorze, a fishing village and summer resort is located on the coast about 13 miles from the Dziwna. A light is shown from a tower standing on a hill nearby. Storm signals are hoisted on a mast close southwestward. Local churches in the area are prominent.

The Riga, a river outlet for an inland lake, enters the sea about 8 1/2 miles from Niechorze. Fishing boats enter this narrow and shoal river and berth alongside revetments extending seaward. There is a basin inside the entrance. The white sector of a light near the eastern revetment leads in the preferred entrance channel. Shoals of 3 to 4 1/2 fathoms extend about 3 1/2 miles off the entrance. A church tower in a village at the entrance is conspicuous.

KOLOBRZEG (KOLBERG)(54°11'N.,15°34'E.)

7D-7 Kolobrzeg is a fishing harbor at the mouth of the Parseta, a river emptying into the Baltic about 49 miles from Swinoujscie and 10 miles from the Rega (sec.7D-6). There is a small naval base in port.

NAVIGATION.—See section 7C-4 and 7D-4. A course of 180° for about 6 miles leads from the easterly approach fairway to Swinoujscie to the Approach Lighted Buoy moored about 7 miles northward of port.

ICE.—Ice usually does not constitute an obstacle to shipping. Freezing may occur during January for about one week. In severe

winters, with onshore winds, the harbor is closed by ice which drifts out quickly with offshore winds.

CURRENTS—WATER LEVEL.—The coastal current sets eastward or westward across the harbor entrance, depending on wind direction. The velocity of the current reaches 3 knots during prolonged periods of stormy weather. The river current sets outward at about 1 knot reaching a velocity of 3 knots after continuous rainfall.

The water level varies about 1 foot above and below mean sea level. Northerly gales raise the level about 3 1/4 feet; southerly gales lower the level equally.

DEPTHS—DANGERS.—The swept channel leading to port is about 36 feet deep. The harbor entrance, between breakwaters, is about 21 feet deep but is subject to continuous silting. Constant dredging is necessary. The harbor inside the entrance is about 20 to 22 feet deep and averages about 18 feet in the commercial part of port.

LIMITATIONS.—Vessels of 1,200 gross tons, about 230 feet long, with a maximum draft of 15 1/2 feet can enter port.

CAUTION.—Vessels should not attempt to enter port when strong onshore winds raise a sea in the entrance, with resulting possible damage to ships being thrown against the breakwaters. See port storm and traffic signals. The coastal and harbor currents meet off the breakwaters. Care must be exercised to avoid a sheer.

Anchoring and fishing is prohibited in an area extending about 1 1/2 miles offshore, about 4 miles on each side of the entrance. The danger of mines is possible in this area and an extension about 1 1/2 miles wide and 9 miles long on each side of the swept channel. Anchoring and fishing is prohibited in a charted area about 7 miles long close eastward of the approach channel.

Several unmarked wrecks, best seen on the chart, lie sunk in the coastal waters near port.

LANDMARKS.—Approaching port, the tower of the lighthouse, with a high church steeple southeastward of it, are conspicuous. Other church spires, the granary near the eastern breakwater and a hotel in ruins are also prominent.

7D-8 HARBOR.—The harbor, formed by the sides of the river, is entered between an eastern and western breakwater about 165 feet apart. At the root of the breakwaters the river channel is less than 100 feet wide. Lights illuminate the sides of the breakwaters. The harbor is 16 1/2 to 19 1/2 feet deep. About 2,100 feet of quays line the river. A quayed naval and yacht basin adjoining the root of the western breakwater is about 10 1/2 to 12 feet deep. A repair basin 1/4 mile southward of the yacht basin is about 11 feet deep and quayed throughout. The fishing basin adjoins the repair basin close southward and is lined with quays. The basin is about 12 1/2 to 14 feet deep. Lights are shown on each side of the narrow entrance of the basin. A bridge spans the river adjacent to the fishing harbor.

SIGNALS.—Storm signals are displayed from a mast near the root of the eastern breakwater. A signal station is located near the root of the western breakwater. By day, three black balls displayed vertically, and at night three red lights shown vertically, indicate the port is closed.

AIDS TO NAVIGATION.—Lighted Buoys "KOL-1", with a radar reflector, and "KOL-2", with a bell, mark the swept channel leading to port. Kolobrzeg light is shown near the root of the eastern breakwater. A fog signal is sounded at the light and a radio-beacon transmits close eastward. Lights are shown at the head of the eastern and western breakwater.

PILOTS.—Pilotage is compulsory for vessels over 100 gross tons and is performed day and night, although pilots may not be available after 2200 hours. A pilot lookout station is located at the western side of the entrance, opposite Kolobrzeg light. The pilot boat meets inbound vessels in the swept channel seaward of the breakwaters. International Pilot Signals are in force.

ANCHORAGE.—Anchorage can be taken in 6 1/2 to 7 fathoms, good holding ground, in close proximity to "KOL-2" lighted bell buoy, with Kolobrzeg light bearing 133° and Gaski light (sec. 7D-10) bearing 077°.

DIRECTIONS.—From KOL-1 buoy (sec. 7D-7), moored about 7 miles northward of port, steer 180° through the swept channel for KOL-2 lighted bell buoy, moored about

1 1/4 miles off the entrance. Thence steer 143°, with Kolobrzeg light ahead, for the entrance and between the breakwaters.

7D-9 KOLOBRZEG, a city of about 25,500 inhabitants, is located on the eastern side of the river adjacent to the harbor. The city is a summer resort with a thriving fishing industry. It is a customs port.

Exports include soda ash, gypsum, calcium chloride, and marble grit. Imports include grain and cellulose.

BERTHS.—Quays line the sides of the river and basins. The eastern quays have railroad connections, and a concrete quay on the western side is 800 feet long, with about 18 feet alongside, and railroad connections. Two eastern quays are 1,260 and 820 feet long with at least 18 feet alongside. The yacht basin has a quay 850 feet long with about 12 feet alongside. The repair basin has a quay 790 feet long with about 11 feet alongside. The fishing basin has quays about 1,840 feet long with 13 feet alongside. A grain quay, with an elevator, is about 525 feet long with 12 feet alongside. There are a few cranes with capacities up to 8 tons on the quays. A 25-ton crane stands on the quay near the repair basin. A harbor tug is available.

Supplies.—Limited quantities of ships' stores and provisions are available. Boiler water is obtained from the river. Potable water is piped to the quays. Limited quantities of fuel oil and diesel oil can be obtained.

REPAIRS.—Minor repairs to hull and machinery can be made. There are marine railways available to fishing vessels.

COMMUNICATIONS.—The port is connected with the Polish railroad system.

DERATTING.—See section 1-9.

MEDICAL.—There is a Health Center and Port Clinic in Kolobrzeg.

COASTAL FEATURES—LANDMARKS (Continued)

7D-10 The low, sandy coast between Kolobrzeg and Darlowo, about 34 miles east-northeastward, is backed by wooded spurs in places and nearing Darlowo by two large lakes. Shallow outlets lead from the lakes into the sea. Gologora, nearly 500 feet high, is a densely wooded eminence standing about 13 miles east-southeastward of Kolobrzeg. A

lookout tower and monument atop Gologora are conspicuous from the offing. The 5-fathom curve along this coast lies about 1 mile offshore.

Gaski Light (54°15'N., 15°54'E.) is shown from a tower standing on the coast about 12 miles from Kolobrzeg. The tower and a church steeple about 3 miles eastward are conspicuous. An obstruction lies about 1 mile offshore and 4 miles westward of the light.

Mielno is a coastal summer resort about 7 1/2 miles eastward of Gaski. Storm signals are hoisted on a mast at Mielno. A submarine cable is laid to Bornholm (Chap. 2).

DARLOWO (RUGENWALDE) (54°26'N., 16°24'E.)

7D-11 Darlowo harbor, at the mouth of the Wieprza, a river emptying into the Baltic, is mainly a fishing harbor with some coastwise traffic.

NAVIGATION.—See section 7D-7. From the easterly coastal track (244°) leading to Swinoujscie (sec. 7C-8), a course of 160° for about 9 miles leads to a position about 1 1/2 miles west-northwestward of the entrance.

ICE.—During normal winters the river current keeps the harbor clear of ice. In severe freezing weather when ice forms in the roads outside port, or blocks the entrance following northerly winds, the port is closed. This usually occurs between the middle of February and the middle of March.

CURRENTS—WATER LEVEL.—The coastal current sets northeastward and southwestward across the harbor entrance, depending on wind direction. With storms blowing parallel to the coast, the current attains a velocity of 2 to 3 knots. Southerly and southeasterly winds produce a weak current. River current depends on wind, water level, and usually flows outward. In the spring and during a thaw the current reaches a velocity of 4 knots.

WATER LEVEL.—The water level varies from 4 to 6 inches below and above, respectively, the mean level. Northerly and southerly gales raise and lower the water level about 5 feet and 2 feet respectively.

DEPTHS—DANGERS.—The entrance between breakwaters is about 16 1/2 feet deep, with 18 feet close seaward. The fairway from the entrance to the drawbridge is about

14 3/4 feet deep, thence to the Industrial Basin is about 16 1/2 feet deep. The dredged channel and harbor basins are subject to silting. The Winter Basin is about 10 feet deep. Fishing and Industrial Basins are about 9 1/2 to 11 feet and 16 1/2 feet deep, respectively.

LIMITATIONS.—Vessels about 246 feet long with a draft of 13 feet can enter port.

DANGERS.—A military restricted area extends along the coast about 1 mile to 4 miles southwestward of the outer harbor.

Rocks and shoal patches along the western edge of the channel in the vicinity of the western breakwater oblige vessels to keep to the eastern side of the fairway. A 1-fathom shoal formed at the mouth of the Grabowka, a river entering the Wieprza about 1/4 mile southeastward of the Fishing Basin, constricts the harbor channel. A submarine cable is laid across the river at the Winter Basin.

CAUTION.—Vessels should not attempt to enter port when strong onshore winds raise a sea in the narrow entrance.

LANDMARKS.—Prominent landmarks seen from the offing include Jaroslawiec light tower (sec. 7D-14) and Gologora tower (sec. 7D-10). Church steeples about 2 miles eastward of the entrance and in Darlowo are conspicuous.

7D-12 HARBOR.—The port of Darlowo consists of an outer harbor, inner harbor, and several basins. The former is formed by two breakwaters extending seaward about 1,300 feet. The entrance between breakwaters is about 125 feet wide. The mouth of the river lies between two old moles at the root of the eastern breakwater. The outer harbor, 5 to 17 feet deep, has a demolished drydock in its southern part and a mooring buoy near the western breakwater.

The inner harbor, about 14 3/4 to 16 1/2 feet deep, is entered between the two moles, about 65 to 75 feet apart, and extends upriver about 700 feet from the root of the eastern breakwater to a drawbridge. The bridge, with an opening about 49 feet wide, spans the river at the inner end of the harbor. Quays line the sides of the river comprising the inner harbor.

The Winter Basin is entered on the western side of the river about 300 yards from the

drawbridge. A light is shown at the eastern entrance of the basin. There are mooring buoys for small craft. The Fishing Basin lies on the eastern side of the river about 1/4 mile from Winter Basin. Quays line the basin. Lights are shown at each side of the entrance. The Industrial Basin, about 16 1/2 feet deep, located on the western side of the river about 3/4 mile from the Fishing Basin, has an entrance about 600 feet wide leading to quays, some having cranes and all served by the railroad. Lights are shown at each side of the entrance.

SIGNALS—SPEED.—The drawbridge opens when 2 long blasts are sounded on the ships' whistle. A green light shown at eastern portal indicates span is open; a red light, span is closed; a yellow light, span is going to open. If bridge is not in operation, 3 red balls by day and 3 red lights at night are hoisted at the center of the bridge.

A signal station is located near the lighthouse at the root of the eastern breakwater. Storm signals are hoisted and a fog signal is sounded near the southern entrance of the inner harbor.

A speed of 3 knots is permitted in the harbor.

AIDS TO NAVIGATION.—Darlowo Light is shown near the root of the eastern breakwater. A light is shown from the head of the eastern and western breakwaters and from the southern entrance of the inner harbor.

PILOTS.—Pilotage is compulsory. Pilots from the station close-by the lighthouse are available between 0600 and 2200 hours. Vessels are boarded in the roads, seaward of the breakwaters.

ANCHORAGE.—Anchorage can be taken in 9 to 10 fathoms with the church in Darlowo bearing 128° and Jaroslawiec light tower (sec. 7D-14) bearing 055°. At night, anchor in 9 fathoms with Darlowo Light bearing 133°.

DIRECTIONS.—From a position about 1 1/2 miles west-northwestward of the entrance, a course of 115° leads to the entrance between breakwaters. Thence steer 106° midway of the breakwaters and into the harbor.

7D-13 DARLOWO, a city of about 10,000 inhabitants, is located on both sides of the Wieprza about 1 1/2 miles from its mouth. There are several factories, a flour mill,

granaries, and fish processing plants in the city.

BERTHS.—At least 5,000 feet of quayage line the river banks and basins. The river quays are 300 to 1,000 feet long with 11 1/2 to 13 feet alongside. The Winter and Fishing Basins have about 5 to 8 1/4 feet and 10 feet alongside, respectively. The Industrial Basin has about 2,000 feet of quayage with 15 to 16 1/2 feet alongside. There are several grain elevators, conveyors, and modern warehouses.

SUPPLIES.—Limited quantities of provisions, stores, fuel and diesel oils are available. Potable water is piped to basin quays.

REPAIRS.—Minor repairs can be made. There are marine railways for fishing craft.

COMMUNICATIONS.—The port is connected with the Polish railroad system.

DERATTING.—See section 1-9.

MEDICAL.—There is a clinic in port and a state hospital nearby.

COASTAL FEATURES—LANDMARKS (Continued)

7D-14 The coast northeastward of Darlowo is composed of sand dunes backed by hilly ranges 3 to 5 miles inland. Local church steeples are prominent. Jaroslawiec (54° 33'N., 16° 33'E.), steep white cliffs, partly wooded, form the coast about 8 1/2 miles from Darlowo. A light is shown from a lighthouse about 1/4 mile inland and a fog signal is sounded about 600 yards northeastward of the lighthouse. From Jaroslawiec, the coast extending about 11 1/2 miles east-northeastward to Ustka, is composed of high sand dunes, partly wooded, and backed in places by lakes. High hills and church steeples, best seen on the chart, are located inland.

The 5 and 10 fathom curves lie about 1 mile and 2 1/2 miles offshore. Slupska Lawica (sec. 7A-3) lies about 17 miles northward of this coast.

USTKA (STOLPMUNDE) (54° 35'N., 16° 51'E.)

7D-15 Ustka harbor, at the mouth of the Slupia, a river emptying into the Baltic, is mainly a fishing port with some coastwise traffic. The city of Slupsk is located about 9 1/2 miles southeastward.

NAVIGATION.—See section 7D-11. From the easterly coastal track (244°) leading to Swinoujscie (sec. 7C-8), a course of 150° for about 9 1/2 miles leads to the harbor entrance.

ICE.—During normal winters the port remains open. Drift ice may be carried into the harbor by onshore winds, or ice may form for 2 to 3 weeks, but swells break up the ice and the outgoing river current carries it out to sea.

CURRENTS—WATER LEVEL.—The coastal current sets eastward or westward across the entrance, depending on wind direction. Average current velocity is about 2 knots with stormy weather. The outgoing river current is noticeable with offshore winds, and during spring thaws may attain a velocity of 3 to 4 knots.

WATER LEVEL.—Northwesterly and northeasterly gales raise the level about 3 1/4 feet; southwesterly and southeasterly gales lower the average water level about 3 1/4 feet.

DEPTHS—DANGERS.—The harbor and entrance thereto is subject to silting. The entrance between breakwaters is about 135 feet wide and 16 1/2 to 18 feet deep, with the maximum along the eastern breakwater. The fairway through the outer and inner harbors is about 16 1/2 feet deep. Basins entered from the river are about 8 1/4 to 18 3/4 feet deep. From Winter Harbor to the railroad bridge the river is about 17 to 19 feet deep.

LIMITATIONS.—During normal weather conditions, vessels about 200 feet long, 37 feet wide, with a draft of 14 3/4 feet can enter port.

CAUTION.—It is inadvisable to enter the harbor with fresh to strong onshore winds.

The heavy seas and coastal current tend to set the vessel onto the breakwater. Anchoring in the roadstead is recommended.

LANDMARKS.—Approaching from the eastward, the tower of Czolpino (54°43'N., 17°15'E.), and Rowokol, a hill about 380 feet high topped by a beacon located 13 miles east-northeastward of Ustka, are prominent. From westward, Jaroslawiec tower (sec. 7D-14), Ustka Lighthouse, a church spire and standpipe in town, are conspicuous.

7D-16 HARBOR.—The port of Ustka consists of an outer harbor, inner harbor, and several basins. Two almost parallel breakwaters, with an opening between heads about 135 feet wide, form the outer harbor. The heads of the breakwaters are painted white and fitted with wooden fenders. About 150 yards inside the western breakwater head, an old molehead extends 100 feet into the harbor at water level. Its head is marked by several white piles projecting about 10 feet above water. The outer harbor is about 14 to 18 feet deep.

The inner harbor, about 13 to 16 1/2 feet deep, is formed by the banks of the Slupia, and extends from Hel Groyne, an old pier opposite the root of the eastern breakwater, to the railroad bridge 1/2-mile southward. The entrance of the inner harbor is about 130 feet wide. Quays line the sides of the harbor.

Basen Weglowy, on the western side of the river near the entrance to the inner harbor, is about 18 feet deep. A repair basin southward of Weglowy is about 8 1/4 to 10 1/2 feet deep. Basen Zimowy, on the eastern side of the river opposite the repair yard is 17 1/4 to 17 3/4 feet deep. A pier about 495 feet long forms the western side of the basin. Fishing

vessels berth at both sides of the pier. The river between the head of the pier and the entrance to the repair basin is about 130 feet wide. A basin, about 17 1/2 feet deep, near the root of the fishing pier is used for collecting river debris. The railroad bridge spanning the river at the inner end of the basin has spurs serving the basins and quays on both sides of the river.

SIGNALS.—There is a signal station located close eastward of Ustka Lighthouse. Storm signals are hoisted from a mast nearby.

AIDS TO NAVIGATION.—Ustka Light is shown about 150 yards southward of the root of the eastern breakwater. A radiobeacon transmits at the lighthouse. A light is shown from the head and root of the eastern breakwater. A fog signal, synchronized with the radiobeacon, is sounded at the root of the eastern breakwater. Lights are shown from the head of the western breakwater, from Hel Groyne, each side of the entrance to Basen Weglowy, and from the head of the fishing pier.

PILOTS.—Pilotage is compulsory. The pilot station, operating between 0600 and 2200 hours, is located in Ustka Lighthouse. Pilots can be obtained in the roadstead, seaward of the breakwaters.

ANCHORAGE.—Anchorage can be taken in 7 to 8 fathoms about 1/2 mile northwestward of the breakwaters. At night, vessels can anchor in 8 to 9 fathoms with Ustka Light and Czolpino Light (sec. 7D-18), bearing 156° and 066°, respectively.

DIRECTIONS.—From the roadstead, steer 150° with Ustka Lighthouse ahead. Nearing the entrance, steer a course to pass along the inner side of the eastern breakwater.

7D-17 USTKA, a town of about 8,000 inhabitants, is located on the eastern side of the Slupia, near the entrance. It is a summer resort and seaport for the city of Slupsk (sec. 7D-15). There are granaries and fish processing plants in Ustka.

BERTHS.—There are over 1 mile of quays fronting the river and in the basins with about 13 to 16 1/2 feet alongside, subject to silting. The fishing pier (sec. 7D-16) has about 16 1/2 to 18 feet alongside.

SUPPLIES.—Limited quantities of stores are available. Fuel oil, limited, can be obtained at Basen Weglowy. Potable water is piped to the fishing pier and quays.

REPAIRS.—Minor repairs can be made. There are marine railways for fishing vessels.

COMMUNICATIONS.—The port is connected with the Polish railroad system.

DERATTING.—See section 1-9.

MEDICAL.—There is a Health Center in port.

COASTAL FEATURES—LANDMARKS (Continued)

7D-18 The coast east-northeastward of Ustka consists of high dunes backed by lakes with shallow outlets to the sea and wooded hills visible from offshore.

Czolpino Lighthouse stands on a high dune, about 1/2 mile inshore and 15 1/2 miles from Ustka. The 5- and 10-fathom curves lie about 1 mile and 2 miles, respectively, off this coast, except northward of Czolpino where the 10-fathom curve lies about 6 miles offshore. Several charted wrecks and foul patches exist in the area.

ROWY (55°40'N., 17°03'E.), a fishing port and summer resort, is located at the mouth

of the Lubawa, a river 8 1/2 miles from Ustka. The entrance, about 6 1/2 feet deep, leads to a basin 3 feet deep. Silting is constant. Shifting shoals at the entrance are caused by a strong river current. Range lights, 141°, at the eastern side of the entrance lead in the approach to the river.

Rowaska Lawica, a rocky 2-to 3-fathom shoal lies about 1 mile northward of Rowy. Buoy "RO", with triangular topmarks, is moored about 200 yards northward of the shoal. Fish nets, sometimes marked by lighted floats, are set out on the shoal. The area should be avoided.

LEBA (54°46'N., 17°33'E.), about 11 miles from Czolpino, is a shallow harbor at the mouth of the Leba, a river outlet for a lake about 1 mile westward. The harbor is formed by two moles with an entrance about 82 feet wide and 6 1/2 feet deep. The river channel inside the entrance is 8 to 9 feet deep, subject to silting. Local knowledge is necessary to enter the harbor.

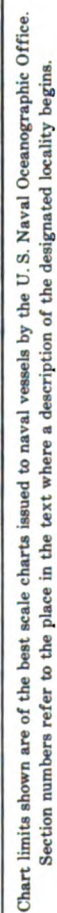
Approach Lighted Bell Buoy "Leba" is moored about 1 mile north-northwestward of the moleheads. Range lights, 160°, shown near the root of the eastern mole, and aligned with the approach buoy, lead into the harbor. Lights are shown on the moleheads. A fog signal is sounded and storm signals are hoisted near the rear range light. A radiobeacon transmits from a position about 200 yards further southward.

The coast eastward of Leba consists of barren dunes for about 10 miles. Stilo Light is shown from a tower about 1/2 mile inland and 6 1/2 miles from Leba. A fog signal is sounded at a tower on the coast northward of the lighthouse. A foul area lies about 8 1/2 miles north-northeastward of Stilo Light.

Eastward of Stilo lie wooded dunes with the coast gradually rising to Rozewie, about 21 miles distant. Beacons mark several of the higher dunes. A church with two towers at Zarnowiec, about 12 miles eastward of Stilo, is prominent from the offing. Several wrecks, best seen on the chart, lie close to the 10-fathom curve. Storm signals are hoisted at Karwia, a village 4 1/2 miles westward of Rozewie.

7D-19 ROZEWIE (RIKHOF) (54°50'N., 18°20'E.), is a steep headland, 177 feet high. A light is shown from a conspicuous tower on the headland which is reported to give a good radar return up to 20 miles. A disused lighthouse stands about 200 yards west-northwestward and a tower about 1 1/2 miles westward of the light tower. A fog signal is sounded and a radiobeacon transmits from the disused lighthouse.

A Danger Area extends about 15 miles offshore from a position on the coast 2 1/2 miles eastward of Stilo Lighthouse. The northern limit of the area lies 11 miles northward of Rozewie.



CHAPTER 8—GRAPHIC INDEX

CHAPTER 8

GULF OF DANZIG

PART A. Rozewie to Cypel Redlowski

PART B. Cypel Redlowski to Baltiysk

PART C. Baltiysk to Mys Taran

Plan.—This chapter describes the coast, approaches, and off-lying dangers between Rozewie and Mys Taran. The sequence of description is from west to east.

GENERAL REMARKS

8-1 The coast between Rozewie (sec. 7D-19) and Mys Taran, a cape about 57 miles eastward, forms a broad bight commonly known as the Gulf of Danzig. The western side of the bight is featured by Hel Peninsula (sec. 8A-5), projecting about 18 miles southeastward. This narrow peninsula is flat and mostly wooded. The coast southward of Rozewie is high, sometimes steep and barren, with sharp cliffs fronted by a narrow beach divided in places by deep canyons. A wooded range of hills near the coast terminates abruptly near the head of the bight. The southeastern side of the bight is formed by a narrow spit consisting of dunes covered by fir trees in the western part. Prominent high land arises inland. The eastern shore of the bay rises gradually from the dunes to high land and steep, rugged cliffs.

Depths of 50 and 60 fathoms in the outer part of the Gulf of Danzig decrease gradually towards the head of the bight. The bottom is soft clay mixed with sand nearing the coast. Rocks and stones lie off the eastern coast and capes, all within the 5-fathom curve which lies about 1 mile offshore. Shoals lie off rivers emptying into the gulf and off capes forming salient features. The 10- and 20-fathom curves parallel the coast about 1 1/2 to 3 miles and 2 1/2 to 6 miles offshore, respectively.

Several prohibited areas, described with related features, lie in the gulf. The major ports of Gdynia and Gdansk are located near the head of the bight. Swept channels lead in the approaches to these ports.

Fishing flourishes in the gulf during the spring and autumn.

NAVIGATION

8-2 See section 7-2. From a position about 5 miles northward of Rozewie (sec. 7D-19), a course of 061° for 52 miles leads to a position about 26 miles northwestward of Mys Taran, the eastern extremity of the Gulf of Danzig. This track leads over a least depth of 16 fathoms about 7 miles northeastward of Rozewie. NEMEDRI (sec. 1-118) should be followed at all times. Detailed information pertaining to port approaches is included in the principal description of the ports.

WINDS—WEATHER

8-3 See section 7-3. The state of the sea depends on the strength and duration of the wind. The shape of the gulf causes differences in sea conditions although wind direction may be the same.

CURRENTS—WATER LEVEL

8-4 Currents in the Gulf of Danzig depend largely on the direction and force of the wind. During calm weather a slight current flows along the shores of the gulf in a northwesterly direction. The water level depends on wind direction. Strong offshore winds from southward cause the water level to fall; northerly winds cause the level to rise. Low levels occur in the summer; high levels in the winter. The range of the water level does not exceed 3 feet.

ICE

8-5 Ice appears in the gulf between December and March. It forms along the shores and extends into the bight in the form of broken masses of floating ice which occasionally makes navigation difficult. South-

westerly and northwesterly winds drive the ice out of the gulf. Icebreakers keep the shipping lanes open, if necessary.

PART A. ROZEWIE TO CYPEL REDLOWSKI

8A-1 Rozewie is described in section 7D-19.

COAST—GENERAL

8A-2 The coast extends about 4 miles southeastward from Rozewie to the root of Hel Peninsula. Thence the coast extending southward to Gdynia is irregular, steep, with bare cliffs fronted by a narrow beach. A mountain (54°49'N., 18°21'E.) is prominent near Rozewie. The wooded sand dunes forming the seaward side of Hel Peninsula distinguish this coast. Church spires and local lights are seen nearing the coast. The gulf lying between the peninsula and the mainland is described with related features.

DEPTHS—DANGERS

8A-3 The 10- and 20-fathom curves, lying about 5 and 10 miles eastward of Rozewie, converge about 1/2 mile offshore at the southeastern end of Hel Peninsula. The 5-fathom curve, parallel and about 1/2 mile off the seaward side of the peninsula, contains all dangers off this coast. The bottom within the 20-fathom curve consists of fine sand.

A Danger Area (sec. 7D-19), extends about 10 miles eastward of Rozewie and 1/2 mile off the head of Hel Peninsula. Mines may exist in the area.

A Prohibited Area, about 9 miles long, in which anchoring and fishing is forbidden, extends about 4 miles offshore between Jastarnia (sec. 8A-6) and the southern end of Hel Peninsula. Ammunition Dumping Grounds lie close northward of the prohibited area and in the middle of the Gulf of Danzig.

NAVIGATION

8A-4 From a position on the track about 5 miles northward of Rozewie (sec. 7D-19), a course of 130° for about 27 miles leads to "HEL" Lighted Whistle Buoy, moored about 4 1/2 miles east-northeastward of Hel Peninsula. This coastal track leads over a least depth of 8 3/4 fathoms about 4 miles north-

eastward of Rozewie. A preferred track, clearing the Danger and Prohibited Areas (sec. 8A-3), leads in deep water from a position about 11 miles east-northeastward of Rozewie, for about 27 miles on course 143°, to Hel Buoy.

COASTAL FEATURES—LANDMARKS

8A-5 BETWEEN ROZEWIE AND CYPEL REDLOWSKI (54°29'N., 18°35'E.), a prominent bluff about 23 miles south-southeastward, the coast is barren and steep except in the southern part where the heights are wooded, closing the coast southward of Gdynia. Church spires about 3 and 5 miles southeastward and south-southeastward are conspicuous.

WLADYSLAWOWO, a busy fishing harbor on the coast at the root of Hel Peninsula, is formed by two breakwaters with an entrance 230 feet wide. Jetties form an inner basin and are used for berthing. A dredged channel, at least 16 1/2 feet deep, leads from lighted bell buoy "WL-A" for about 1 mile to the outer breakwater. Range lights on mast beacons lead through the fairway. Inside the breakwaters, the harbor is 14 1/2 to 16 1/2 feet deep. Depths in the channel and harbor are subject to continuous change. Vessels with a draft of 13 feet can enter the harbor and berth alongside. Lights are shown on the head of each breakwater and the jetty heads. A fog signal is sounded at the front range beacon. Storm signals are displayed from a steel mast serving as an excellent radar target.

HEL PENINSULA.—The seaward side of the peninsula (sec. 8-1), is fringed by shoals of hard sand fronting a narrow beach. The approaches are rather steep—to outside the coastal shoal necessitating caution on a near approach during fog and onshore winds. Jastarnia Lighthouse (54°42'N., 18°41'E.) and a church spire about 1 mile northeastward are conspicuous. Fog signals are sounded from a tower near the lighthouse. The tower is an excellent radar target as is the storm signal mast at Kuznica, about 10 1/2 miles from Rozewie. A church spire at Kuznica is prominent. Gora Szwedow Lighthouse stands on a coastal hill about 6 1/2 miles southeastward of Jastarnia. International signal "T" is sounded as a fog signal from the lighthouse.

Hel Lighthouse stands about 1/2 mile from

the extremity of the peninsula. A Radio-beacon transmits at the lighthouse and a fog signal, synchronized with the radio-beacon, is sounded about 1/4 mile southeastward. Storm signals are hoisted at a signal station located at the lighthouse. A tower stands about 3 1/2 miles north-northwestward of the peninsula extremity. Two other towers stand on shoals about 2 1/2 and 3 1/4 miles west-northwestward of the first tower. Beacons stand close southwestward and about 1 1/4 miles northwestward of Hel Lighthouse. Submarine Cables are laid from the end of the peninsula to the mainland south-southwestward. Foul ground extends about 1/2 mile south-southwestward of the extremity of Hel. South Lighted Buoy "HL-S" is moored close southward of the foul area.

HEL (54°36'N., 18°48'E.), is a fishing harbor on the western side of the southern extremity of Hel Peninsula. The outer harbor is formed by two breakwaters and is sheltered from northerly and westerly winds. An inner basin is enclosed by two moles with an entrance between moleheads about 165 feet wide. Vessels with a draft of 12 feet can enter the harbor through a channel marked by buoys on the western side. Buoy "HL-S" is moored in the outer approach to the channel. Three piers in the inner basin are about 1,000 to 1,300 feet long. Lights are shown from the inner moleheads and from the head of the southern breakwater. A fog signal is sounded at the root of the southern breakwater. Foreign vessels cannot enter port unless authorized to do so by the harbor master.

Hel Naval Harbor, about 1 mile north-northwestward of the fishing harbor, is formed by two jetties.

8A-6 ZATOKA PUCKA is the northwestern part of the Gulf Danzig. The bay, lying between Hel Peninsula and the mainland, is entered between the southern end of the peninsula and Cypel Oksywski, a bluff about 9 miles west-southwestward. Rybitwia Mielizna, a shoal which dries with southwesterly winds, extends across the bay between Rewa (54°38'N., 18°31'E.), and Kuznica, on the peninsula. Between the shoal and the head of the bay there are depths of 1 to 2 fathoms. Shoals of less than 1 fathom extend 1-to 2-miles off Hel Peninsula. The edge of the shoal is steep-

to. Several small rivers discharge into the western side of the bay. The outer part of the bay has depths of 7 to 30 fathoms, decreasing gradually toward the mainland and Rybitwia Mielizna. Numerous obstructions and foul patches, best seen on the chart, are scattered throughout the bay.

RESTRICTED AREAS and ANCHORAGES.—Zatoka Pucka and the area northward of the shipping lane to Gdynia is closed to foreign shipping. Anchorage is prohibited in most of the area and in a charted area lying close northward of the entrance to Gdynia. Submarine cables are laid across the charted area to Hel Peninsula.

Compasses can be adjusted with the aid of beacons with red and white slatted topmarks standing near and aligned with Hel Lighthouse. The true bearings from eastward to westward are 315°, 360°, 045°, and 090°. A measured distance of 2 miles is indicated on the chart by three pairs of beacons on the southwestern side of Hel Peninsula. Buoys moored in alignment with the beacons allow a course run of 320°.

JASTARNIA, (54°42'N., 18°41'E.), a fishing harbor about 7 1/2 miles northwestward of Hel Lighthouse, is approached through a channel entered about 2 miles southwestward of Hel Light. Buoys J-1 through J-5 mark the channel fairway, at least 39 feet deep. The harbor, formed by breakwaters is about 16 1/2 to 19 1/2 feet deep and ice-bound during the winter. Wharves have 8 1/2 to 14 3/4 feet alongside. The entrance channel, at least 16 1/2 feet deep, leads from J-5 Buoy to the harbor entrance. Buoys mark the sides of the entrance channel and range lights in the harbor lead through the fairway. A light is shown from a structure about 1/2 mile southward of the entrance. All buoys are removed in winter. A fog signal is sounded near the front range beacon. See section 8A-5 for other Aids to Navigation.

KUZNICA, a fishing harbor about 4 miles northwestward of Jastarnia, is approached through a dredged channel about 9 1/2 feet deep. Range lights and daymarks ashore lead to a harbor about 5 feet deep. Lighted buoy "KUZ" is moored in the fairway about 1 mile from the harbor entrance. The local church tower is prominent from offshore.

PUCK (54°44'N., 18°25'E.), is a fishing and

commercial harbor on the northwestern side of Zatoka Pucka, opposite Kuznica. Glebinka Channel, about 10 feet deep, leads across the shoal about 1 mile northeastward of Rewa (sec.8A-6) in the outer approaches to Puck. The channel is marked by unlighted buoys and Lighted Bell Buoy "GL" at the eastern entrance. Range beacons ashore lead through the channel. Range lights, astern, on Rewa lead northward to Puck entrance channel, marked by buoys and range lights. The channel, about 10 feet deep, leads into a harbor 10 1/2 feet deep with piers having about 8 1/2 feet alongside. Lights are shown on each side of the harbor entrance. Ice curtails navigation during the winter when many buoys are removed.

The COAST northward of Puck contains a river valley forming marshes extending along the coast. Rzucewo, a cape about 2 1/2 miles southeastward of Puck is covered by woods. A light is shown from the cape. Swamps and peat bogs extend coastwise southward of Rzucewo. Southward of Rewa (sec.8A-6) and its off-lying spit, the high land is fronted by stones forming a protective wall in places to Oksywski, a cape about 5 1/2 miles from Rewa. Groins extend seaward. The steep cape and narrow beach is fronted by rocky shoals. A church near the bluff is conspicuous. A mole at the cape has an obstruction near its head.

GDYNIA (54°32'N., 18°33'E.)

8A-7 The port of Gdynia, located in the southwestern part of the Gulf of Danzig, is the most modern port in Poland, ranking first among Polish ports in general cargo turnover. At least 30% of Poland's seaborne commerce is handled at Gdynia, which also serves as a transshipping center for inland nations.

NAVIGATION

8A-8 See section 8A-4. From a position about 1/2 mile eastward of "HEL" Buoy, with a radar reflector, steer a course of 221° for about 7 1/4 miles through the swept channel to "GN" Lighted Whistle Buoy, with a radar reflector, moored about 3 1/2 miles southward of the extremity of Hel Peninsula. From "GN" Buoy steer 271° through the swept channel for 7 miles to Approach Lighted Whistle Buoy "GD",

moored about 1 1/2 miles eastward of the principal entrance to port.

WINDS-WEATHER

8A-9 See section 8-3. Hel Peninsula affords shelter from northwesterly seas and winds.

ICE

8A-10 See section 8-5. The roadstead and port are usually free of ice. During prolonged freezing weather, ice may form, lasting from January to March. If necessary, ice-breakers and tugs keep the channel and port open to shipping.

TIDES-TIDAL CURRENTS

8A-11 See section 8-4. Tides are not significant. Surface currents depend on wind direction, with a northerly flow predominating. With northerly and northeasterly winds the current flows southward. A velocity of 2 knots may be attained.

DEPTHS-DANGERS

8A-12 The entrance channel is 39 feet deep with 37 feet close southward of the entrance range. The middle or principal entrance for commercial ships is 40 to 43 feet deep. The northern entrance, used by naval ships, is 29 feet deep and 200 feet wide. The southern entrance, used by fishing vessels and coastal passenger vessels is 27 feet deep. The entrance to the inner harbor is about 40 feet deep, with 33 to 35 feet inside the harbor at the turning basin. The outer harbor is at least 35 feet deep.

Silting, caused by river sediment, is prevalent in the harbors and entrance channel. The water level is raised and lowered, respectively, by northerly and southerly winds. Maximum range is about 3 feet.

There are no dangers existing in the entrance channel and harbors.

LIMITATIONS.—Ships of 30,000 d.w.t., with a draft of 36 feet, can enter the harbor. The "Manhattan", 106,000 d.w.t., partly loaded, has discharged grain at French Quay.

ASPECT-LANDMARKS

8A-13 The low, sandy coast around Gdynia is backed by wooded hills in the interior. Prominent landmarks include church steeples

and antenna (radar) masts close northward of Gdynia, the grain elevator on Gdynia Wharf, the tower of the Metallurgical Institute and a tower atop the Harbormaster's Office.

HARBOR

8A-14 The artificial harbor of Gdynia, extending 2 miles southward of Cypel Ok-sywski (sec. 8A-6), is fronted by a breakwater about 1 1/2 miles long. Three openings in the breakwater lead into the outer harbor. The principal entrance, 500 feet wide, lies about 1/2 mile eastward of the entrance of an inner harbor formed by two short breakwaters with an opening 350 feet wide. There are idle ship moorings alongside the breakwater usually used in an emergency. The rectangular outer harbor contains six basins. It is about 1 1/2 miles long and is primarily used for handling coal, iron ore, fish, some general cargo and passengers. Deep-draft ships are lightened here before proceeding to assigned berths. The inner side of the main breakwater may be used for idle ship mooring. A lighted buoy marks the outer edge of shoals extending off the western side of the outer harbor.

The southern part of the outer harbor consists of four basins formed by piers approached through the main and southern entrances, the latter about 300 feet wide. A channel about 330 feet wide and 23 to 30 feet deep, joins the entrances and leads between the pierheads and breakwater. A turning area, inside the main entrance, is at least 35 feet deep. Basin No. 1 is 26 to 30 feet deep. The remains of an old breakwater lie off the northern entrance. Basin No. 2, for bulk cargoes, and the site of a fish combine, is 30 feet deep. The Gdynia Ship Repair Yard is located at the western side of the basin. Basin No. 3, for bulk cargoes, is 26 to 36 feet deep. A 5 1/4-fathom patch, marked by a buoy, lies off the pierhead forming the northern side of the basin. A yacht and small craft repair basin, about 16 1/2 feet deep, lies close southwestward of South Pier, located at the southern end of the outer harbor.

The triangular Inner Harbor extends almost 2 miles northwestward from its entrance (54°32'N., 18°33'E.). It contains six basins used for general cargo, grain, edible and

fuel oils, and by the navy. The Paris Commune Shipyard is located at the northwestern end, and a shipyard at the northeastern end. Pierheads and mooring dolphins mark the edge of shoals extending off the shipyards.

Kanal Przemyslowy, 36 feet deep, is the channel leading through the inner harbor. Basin No. 8 lies at the inner end and Basin No. 9, at the outer end of the channel. The former, about 7 to 40 feet deep, is engaged in repairs to ships. The latter, about 26 to 30 feet is similarly engaged. Basins 4, 5, 6, and 7 lie on the southern side of the channel. Commercial ships berth at broad piers forming the sides of the basins and extending to the edge of the channel. Basins 4 and 5 are each 33 feet deep. Basins 6 and 7 are 23 to 42 feet deep, respectively. Both are used for repairs and fitting-out.

SIGNALS.—A signal station, located in the tower of the Harbormaster's Office at the entrance of the Inner Harbor, communicates with ships by International Signals and Morse Code. Storm signals are hoisted at Oksywie.

Traffic signals are in force. Three black balls, vertical, by day and three red lights shown vertically at night from the signal station and at the southern entrance, indicates a serious situation wherein entry into port is prohibited. Normally, entry is prohibited by day when a cone between two black balls is displayed vertically. At night, a white light is shown between two red lights, vertical. Departure from port is forbidden by day when three cones are displayed vertically, with the upper and lower pointing down. At night, a white light is shown between two green lights, vertical. Entry and departure are prohibited by day when two cones, point to point, are displayed above a ball; at night, a green and a red light, respectively, are shown above and below a white light.

Special rules and regulations are in effect for the port of Gdynia. Consult the pilot and harbormaster.

AIDS TO NAVIGATION

8A-15 See section 8A-8. Lighted Buoy "GD-S" (54°31'N., 18°34'E.), marks the western side of the southern entrance to port. Lights in Range, 271 1/2°, shown from framework structures with a red band, are located on the head of the northern breakwater of

the inner harbor and on the corner of Yugoslav Quay, about 1/2 mile westward. Lights are shown at each side of the entrances leading into the outer and inner harbors. A fog signal is sounded at the southern side of the main entrance to port and from the breakwater head at the southern entrance. Numerous lights, best seen on the chart, are shown from the various pierheads throughout the harbor.

PILOTS

8A-16 Pilotage is compulsory. Pilots can be obtained at any time, on prior notice, between Buoy "GD" and the main entrance to port. Ships with a draft over 30 feet should not proceed westward of the buoy without a pilot aboard. Prior notice to radio station UKF on 156.6 mc. giving name, tonnage, draft, and E.T.A. improves pilot service. The radar station transmits messages on ship movements via radiotelephone to pilots.

ANCHORAGE

8A-17 Anchorage can be taken in 5 1/2 to 8 1/4 fathoms, sand and shells, in an area extending about 2 miles eastward of the breakwater and 1 mile southward of Buoy "GD". Ships with a draft over 30 feet anchor close southward and southeastward of the buoy. Mooring buoys are not available. The anchorage is open to easterly weather.

DIRECTIONS

8A-18 See section 8A-8. From Buoy "GD", steer 271 1/2° on the entrance range (sec. 8A-15), through the main entrance of the outer harbor. Thence a course of 268° leads to the entrance of the inner harbor.

FACILITIES

8A-19 Gdynia ranks second behind Gdansk in total cargo handled. The port, an important shipbuilding and ship repair center, is the home port for a fleet of fishing vessels. Gdynia, a first port of entry, has a population of about 165,000.

Exports include coal, cement, timber, foodstuffs, and general cargo. Imports include ores, fertilizers, crude oils, cotton, grain, and general cargo.

BERTHS.—Basin 1: Pomeranian Quay, on the southern side of the basin, has 18 to

25 feet alongside. President's Quay has 20 feet, and Wilson Quay, 18 to 22 feet alongside. Fishing Pier has 18 to 23 feet alongside.

Basin 2: English Quay, about 1,650 feet long on the southern side of the basin, has 23 to 28 feet alongside. The fishing harbor quays have 20 to 23 feet alongside. Quays at the shipyard have 20 to 29 feet alongside. Silesian Quay, about 1,750 feet long, has 29 to 30 feet alongside. A berth facing the outer harbor is 800 feet long with 32 to 33 feet alongside.

Basin 3: Swedish Quay is about 2,330 feet long with 25 to 28 feet alongside. Danish Quay, facing the inner side of the basin, is about 1,000 feet long with 25 to 30 feet alongside. Two coal piers extending from Danish Quay, are 390 feet long with 26 feet alongside. Harbor craft berth at Danish Quay. Dutch Quay, for ores and grains, is about 1,370 feet long with 30 to 32 feet alongside. Belgian Quay, a lay berth, is 485 feet long with 30 feet alongside.

French Quay, for passenger traffic, general cargo and grain discharge, is about 1,400 feet long with 35 to 40 feet alongside. There is a radar tower on the quay.

Basin 4: Finnish Quay, close within the inner harbor entrance, is 590 feet long with 33 feet alongside. The pilot station is located here. Polish and Indian Quays, for general cargo, are 3,700 and 3,300 feet long with 31 to 33 feet and 23 to 33 feet alongside, respectively. Rotterdam Quay is 990 feet long with 23 to 26 feet alongside. Grain, edible and fuel oils are discharged at Indian Quay. Norwegian Quay is 860 feet long with 26 feet alongside.

Basin 5: Peace (American) Quay, 2,680 feet long and Rumanian Quay, 2,800 feet long, have 30 to 32 feet and 31 to 33 feet alongside, respectively. Czechoslovakian Quay, at the head of the basin is 700 feet long with 29 feet alongside. General cargo is handled at these quays. Yugoslav Quay is 550 feet long with 23 feet alongside.

Basin 6: Hungarian, Albanian, and Southwest Quays are 2,240, 1,300, 820 feet long with 20 to 32 feet, 27 feet, and 25 feet alongside, respectively. These are shipyard quays.

Basin 7: The southern side has a quay 330 feet long with 25 feet alongside. The northern side has a quay 950 feet long with 30 to 35 feet alongside. A drydock adjoins the northern of these two fitting-out quays. A

quay close northward of the drydock is 900 feet long with 30 to 35 feet alongside.

Basin 8: West Quay, formerly Lithuanian Quay, is 3,000 feet long with 10 to 26 feet alongside and is used by naval vessels. The piers fronting the northern part of the inner harbor are naval shipyard and bunkering piers.

Numerous harbor tugs are available. In-bound ships are met at the main entrance of the harbor. The principal quays are served by the railroad. Numerous cranes with a lifting capacity of 1 1/2 to 8 tons serve the general cargo quays. There is large capacity gear for grain, ore, and coal, also several floating cranes, the largest lifting about 125 tons.

SUPPLIES.—Water is piped to most of the quays. Ships' supplies and provisions are procurable in quantity. Diesel oil is piped to English Quay, Wilson Quay, and the Fishing Harbor. Fuel oil is available at Indian and Norwegian Quays. There are water boats, oil barges, and numerous lighters. Fuel oil should be ordered 5 days prior to arrival in port.

REPAIRS.—Major hull and machinery repairs can be made. There are several floating drydocks, the largest with lifting capacities of 3,500, 6,000, and 8,000 tons. Pontoon docks, the largest lifting about 1,700 tons are available. Several floating cranes with lifting capacities up to 100 tons are available. Cranes, capable of lifting 160 and 180 tons and a 500-ton gantry crane serve the Paris Commune Shipyard which has a drydock about 785 feet long, 130 feet wide, with a capacity of 60,000 d.w.t. Tankers of 23,000 d.w.t. have been built.

COMMUNICATIONS.—The harbor area is connected by railroad with the state system. There are world-wide shipping connections. Radio and cable facilities are available. There is an airport near Gdansk.

DERATTING.—See section 1-9.

MEDICAL.—Sanitary conditions in the city are fair. No set pattern prevails for handling medical inspections. Deaths and contagious diseases aboard ship must be reported to the port medical officer. There are hospitals in the city. Medical clinics are also available.

ANCHORAGES

8A-20 WLADYSLAWOWO.—Anchorage can be taken in 4 1/2 fathoms, sand, sheltered

from southerly and southwesterly winds, between Rosewie (sec.7D-19) and Wladyslawowo (sec.8A-5). Northwesterly winds raise a heavy swell.

ZATOKA PUCKA.—Anchorage can be taken during onshore storms in Zatoka Pucka in 6 to 20 fathoms, clear of prohibited anchorages.

GDYNIA.—See section 8A-17.

PART B. CYPEL REDLOWSKI TO BALTIYSK

8B-1 Cypel Redlowski is described in section 8A-5.

COAST—GENERAL

8B-2 The semi-circular coast between Cypel Redlowski and Baltiysk, about 47 miles eastward, forms the inner part of the Gulf of Danzig. The coastline is broken only by the two outlets of the Wisla (Vistula) River. Sand dunes, covered by pine woods in the western part, forms most of this low coast. For about 23 miles eastward of Nowy Port the low land backing the coast is cut by numerous streams and canals forming the delta of the Wisla. Thence the coast to Baltiysk consists of a low, narrow neck of land about 30 miles long. Backing this isthmus is Frisches Haff, an extensive bay, leading to local harbors reached through a land cut at Baltiysk. The high land forming the southern coast of the bay is visible from the offing. Groves of trees on the coastal neck appear as wooded islands from offshore.

DEPTHS—DANGERS

8B-3 See section 8-1. There are no off-lying dangers.

NAVIGATION

8B-4 See section 8-2. From a position on the track at 54°55'N., 18°20'E., a course of 104° for about 48 miles leads to the swept channel off Baltiysk. A preferred course of 111° for about 44 miles leads from 10 1/2 miles north-northeastward of Rozewie and the Danger Area (sec.7D-19), to the swept channel entrance off Baltiysk.

NEMEDRI (sec.1-118), should be followed along this coast. From the entrance of the swept channel, about 20 miles eastward of "NP-5" Lighted Whistle Buoy (sec.8B-6), a

course of 040° for about 23 miles leads to the Baltiysk entrance channel.

COASTAL FEATURES—LANDMARKS

8B-5 The steep, cliffy coast southward of Gdynia terminates at Cypel Redlowski (sec. 8A-5), then curves southeastward for about 5 1/2 miles to Nowy Port. A sea wall protects the beach near Gdynia. The high coast to Sopot (54°27'N., 18°34'E.), is generally backed by wooded heights, with a narrow valley intervening close southward of Cypel Redlowski. A church tower near the valley and buildings at Sopot are conspicuous. The rocky coastal shoal, drying in places, extends about 2 1/2 miles offshore. Buoys mark obstructions on the shoal in the vicinity of Cypel Redlowski. During the fishing season nets are set out along this coast, which should not be approached without local knowledge. The coast between Sopot and Nowy Port is low, sandy, and level.

SOPOT, a popular summer resort with a bathing beach is located about 2 1/2 miles southward of Cypel Redlowski. Hotels, churches in town, and a lighted bathhouse tower at the beach are prominent. A pier about 1,500 feet long, with a depth of 20 feet at its head, extends off a shore landing. Lights are shown from the landing, pier, and a fog signal is sounded during the summer season.

Jelitkowo and Brzezno are summer resorts on the coast between Sopot and Nowy Port. The latter, about 3/4 mile westward of Nowy Port, has a conspicuous church. Range lights and a radiobeacon near Brzezno are described in the approaches to Nowy Port.

NOWY PORT (54°25'N., 18°40'E.)

8B-6 Nowy Port, the outport of Gdansk, is formed by the old mouth of the river Wisla (Vistula) and adjoining basins. The river runs through a low plain, covered by sand hills and interspersed with lagoons.

NAVIGATION.—See section 8A-8. From Lighted Whistle Buoy "GN", moored at the junction of the Gdynia-Gdansk fairways, steer a course of 221° for about 7 miles through a swept channel about 1 mile wide, over a least depth of 44 feet, to Lighted Whistle Buoy "NP 1". Continue on this course for about 1 mile to Lighted Whistle Buoy "NP 5". Both

buoys have radar reflectors. A pilot is boarded and anchorage taken in the vicinity of the buoys.

A directional radiobeacon (Pub. 117A), located about 2/3 mile west-northwestward of Brzezno (sec. 8B-5), transmits a series of dashes and dots (NP) during inclement weather or on request to the harbor master at Gdansk. Ships inbound from Hel Buoy (sec. 8A-4), proceed on the western side of the swept channel, indicated by the dashes on a bearing of 221°. Outbound ships keep to the eastern side of the swept channel, indicated by the dots on a bearing of 041°.

WINDS—WEATHER.—See section 8-3. The port is protected by its inland location, the shores of the bay and Hel Peninsula, from the prevailing northwesterly and westerly winds. A breakwater at the harbor entrance provides partial shelter from rough seas and prevents movement of silt into the river mouth. Northerly gales can raise a high sea at the entrance, making entry hazardous.

ICE.—See section 8-5. Prolonged freezing weather accompanied by onshore winds, causes ice to form in the roads and off the entrance. Offshore winds and currents set the ice out to sea. Shipping is hindered during severe winters but icebreakers keep the shipping lanes open unless unusual conditions prevail.

CURRENTS—WATER LEVEL.—See section 8-4. Tidal current is negligible. Surface currents depend on wind direction. A westerly flow occurs with easterly winds and an easterly flow with westerly winds at the port entrance and roads. The average strength of the current is 1 knot; rarely 2 knots with a westerly wind. A slight current flowing northwestward during calms is caused by the Wisla entering the gulf eastward. The current always flows seaward from port, even with a strong northwestwesterly wind. The rate is less than 1 knot.

DEPTHS—DANGERS.—There is 6 1/2 to 13 1/2 fathoms in the approaches to port and 5 3/4 to 6 1/2 fathoms in the roadstead. The entrance channels from seaward are 39- and 37 1/2 feet deep, and about 820 and 525 feet wide, respectively. The port entrance is 425 feet wide. At the turn leading to the Westerplatte range the channel is about 980 feet

wide. There is about 36 feet in the center of the harbor.

The coastal shoal, with depths of 2 to 6 fathoms, extends about 2 miles northward and eastward of the entrance. Dredged entrance channels lead over sand bars. Foul patches about 4 fathoms deep, marked by a lighted bell buoy and unlighted buoys, lie 2 miles northward of the eastern breakwater. Numerous 4 1/4 fathom patches lie within 1 mile of the entrance channels. Charted patches of 2 3/4 and 3 fathoms lie close to the entrance channel and within 1/2 mile of the eastern breakwater.

Anchoring and fishing is prohibited in charted areas in the approaches to port. The swept channels must be followed. Consult the latest NEMEDRI. Submarine cables are laid from close eastward of the harbor entrance to the southern extremity of Hel Peninsula and to the coast east-southeastward of port. Beacons mark the landings.

LANDMARKS.—Approaching port, the main lighthouse in town and twin church spires southeastward appear prominently. A high chimney and a silo close northwestward of the church are conspicuous. A monument, 150 feet high and lighted at night, stands 1/4 mile southward of the main lighthouse.

8B-7 HARBOR.—The harbor, entered between a very short western and much longer eastern breakwater, is an improved natural harbor at the old mouth of the Wisla. Nowy Port consists of Kanal Portowy, the river channel, extending about 1-mile from the port entrance to Zakret Pieciu Gwizdkow (Five Whistles Corner). Ships with a draft of 35 feet can enter the harbor if weather conditions are favorable. Kanal Portowy is at least 490 feet wide and 36 feet deep in the fairway. Two artificial basins lead from Kanal Portowy, about 800 feet inside the entrance. Westerplatte, the eastern basin, is 1,250 feet long, 175 to 650 feet wide, and 19 to 35 feet deep. Wladyslaw IV Basin, extending 2,300 feet southwestward, is a transshipment basin used for working general cargo and idle ship mooring. The basin is about 290 feet wide and 20 to 37 feet deep. Ships can turn in an area 36 feet deep at the common entrance to both basins.

A small boat basin about 330 feet long and 8 feet deep lies on Kanal Portowy opposite the southern entrance to Westerplatte Basin. The basin is used as a pilot harbor and by fishing vessels as a harbor of refuge. A bridge at the entrance is opened on request.

SIGNALS.—There is a naval signal station at the northern entrance of Westerplatte Basin. A signal mast for the exchange of International Code signals stands close northward of the lighthouse (54°24'N., 18°40'E.). Traffic signals are exhibited at the lighthouse as follows: A semaphore arm turned downwards, by day, or 3 red lights, vertical, at night, indicate entry into port is prohibited. The arm turned upwards, or 3 green lights similarly disposed, indicate departure from port is prohibited. The semaphore arm in a horizontal position, or 3 red and 3 green lights aligned, indicate entry and departure are prohibited.

There are special rules and regulations in force for ships entering Nowy Port and proceeding to Gdansk. Consult the pilot and obtain copies of regulations issued by the harbor master. Ships about 400 feet long, of 5,000 G.R.T., must employ at least 2 tugs within the harbor. Ships laden with inflammable or explosive cargoes cannot enter port at night.

AIDS TO NAVIGATION.—See section 8B-6. Lights are shown from the head of the eastern breakwater and from the western breakwater. A fog signal is sounded at the root of the former. Lights in Range, 196°, are shown from framework structures with triangular daymarks located at Brzezno (54°25'N., 18°39'E.). These range lights lead from close eastward of "NP-5" Buoy (sec. 8B-6), through the outer entrance channel, marked by lighted buoys. Lights in Range, 147 1/2°, shown from structures with triangular daymarks located near the root of the eastern breakwater, lead through the inner entrance channel to the port entrance. Range beacons mark the sides of the channel. Lighted buoys with radar reflectors are moored at the eastern and western intersections of the channels. Lighted and unlighted buoys mark the sides of the inner entrance channel. Lights are shown from pole beacons at the basin entrances and along the sides of Kanal Portowy.

PILOTS.—Pilotage is compulsory. The pilot station is located close northward of Nowy Port Light. Pilots can be obtained in the vicinity of NP-5 Whistle Buoy (sec.8B-6). International pilot signals are in force. Ships with a draft greater than 31 feet are boarded close northward of Buoy "NP 1" (sec.8B-6). If rough seas prevent the pilot boarding a ship, the pilot vessel will display a red flag by day and show a red flare at night, then precede the inbound ship into the harbor where a pilot is boarded. In normal weather, pilots are available at any time on prior notice of arrival.

8B-8 ANCHORAGE.—Anchorage is restricted. Ships with a draft between 26 feet and 30 feet must anchor in 5 1/2 to 6 fathoms in a circular area 2/3 mile wide, with its center about 1 1/2 miles northward of the eastern breakwater. The recommended anchorage is westward of the Brzezno range alignment.

Ships with a draft less than 26 feet can anchor in the above anchorage or in 5 fathoms between 3/4 mile and 1 3/4 miles northward of the Brzezno front range light structure.

There are no mooring buoys in the harbor or anchorages. Holding ground is sandy and only fairly tenable.

DIRECTIONS.—See section 8B-6. From "NP-5 Whistle" Buoy steer 196° on the Brzezno Entrance Range (sec.8B-7), for the entrance channel marked by No. 1 and 2 lighted buoys. Thence steer 147 1/2° on the Inner (Westerplatte) Range between the buoys marking the sides of the channel and into the harbor between breakwaters.

8B-9 NOWY PORT, a suburb of Gdansk, with a population exceeding 30,000, is situated on the southern side of the harbor. It is a first port of entry. Westerplatte, on the northern side of the harbor, is a bathing and summer resort.

BERTHS.—Marchlewski Quay, forming the northern side of Wladyslaw IV Basin, is about 2,300 feet long with 28 to 32 feet alongside. Berths for general cargo, fruit, and chemicals have numerous cranes of 3 1/2 to 6 tons capacity. Wladyslaw IV Quay, forming the root of the basin, is 225 feet long with 30 feet alongside. The quay is used for idle mooring.

Warynski Quay, forming the southern side of the basin, is 1,800 feet long with 32 to 34 feet alongside. This general cargo quay is served by numerous cranes with a capacity of 3 1/2 to 10 tons.

Westerplatte Basin Quay, forming the northern side of the basin, is 1,160 feet long with at least 19 feet alongside.

The Defenders of Westerplatte Quay, forming the northern side of Kanal Portowy, is at least 4,900 feet long with 23 to 30 feet alongside. This quay, partly used for idle ship mooring, is served by cranes of 3 to 6 tons and is a livestock export center with timber export facilities.

Oliwa Quay, on the southern side of Kanal Portowy, a general cargo quay also used for idle mooring of ships and crane assembly is at least 4,700 feet long with 17 to 28 feet alongside. Several 3 to 5 ton cranes serve the berths.

All of the quays have railroad connections. Harbor tugs are available including two diesel tugs of 1,600 hp.

SUPPLIES.—Provisions and stores are available in quantity. Water is piped to the quays. Fuel and diesel oils are obtained by oil barge from Gdansk or at oil bunker piers at Gdansk.

REPAIRS.—Major repairs to hull and machinery can be made at Gdansk.

COMMUNICATIONS.—The port is connected by railroad with Gdansk, Gdynia, and the interior via the general rail system. There is an airport near Gdansk. Shipping is carried on with Baltic ports.

DERATTING.—See section 1-9.

MEDICAL.—Hospitals and clinics are available at Gdansk. There is a Quarantine Station and hospital close westward of the port entrance. International Sanitary Regulations are in force.

GDANSK (DANZIG) (54°22'N., 18°40'E.)

8B-10 The port of Gdansk, on the southwestern side of the Gulf of Danzig, is situated about 9 miles southeastward of Gdynia. Gdansk has an improved natural river harbor consisting of quayed river banks and basins. It is the principal shipbuilding and ship-repairing center of Poland. The port serves the interior as a transshipment ter-

minus. River barges transport cargo over an inland waterways system consisting of the Wisla River and its branches.

NAVIGATION

8B-11 See section 8B-6.

WINDS-WEATHER

8B-12 See section 8B-6.

ICE

8B-13 See section 8B-6. Ice usually is present between early January and early March. The port may be closed to shipping about 2 days annually.

TIDES-TIDAL CURRENTS

8B-14 See section 8B-6. Tides are negligible. There is a slight current flowing seaward from port at all times. It is significant only because of its movement of rubble. Debris and floating ice are carried to sea by the main river channels eastward of port. Silting is not a major problem as a sluice separates the port from the main channel of the river.

DEPTHS-DANGERS

8B-15 See section 8B-6. There is a depth of 36 feet in the fairway of the river between Zakret Pieciu Gwizdkow (sec. 8B-7), and the turning basin off the northern end of Ostrow Island (Wyspa Holm). This stretch of the Martwa Wisla, a branch of the Wisla (sec. 8B-6), leads around the western side of the island to its southern extremity and continues eastward. There are depths up to 26 1/2 feet in the river westward of the island. Controlling depths vary from 30 feet in the river northward of the island to Five Whistles Corner (sec. 8B-7), to 20 feet as the river approaches the railroad bridge about 5 1/2 miles above its mouth. Eastward of the bridge the controlling depth is about 7 feet.

Kanal Kaszubski, with a depth of 30 feet in the fairway, extends along the eastern side of Ostrow Island. An artificial channel, it is the main link joining the Martwa Wisla northeastward and southeastward of the island.

The Motlawa, a river emptying into the Martwa Wisla opposite the southeastern end of Ostrow Island, flows through Gdansk in

depths suitable for harbor craft and inland waterways vessels or barges.

DANGERS.—There are few dangers between Nowy Port and Gdansk. Buoys or dolphins mark shoals outside the fairways. Reconstruction work and dredging calls for the placing of aids which are shifted to meet changing conditions. Several bridge spans and ferries cross the river. There is a river-level gage at Five Whistles Corner.

LIMITATIONS.—Fairway limitations are imposed by dimensions and depths of berths rather than by controlling depths leading to them. Ships about 650 feet long, between 30,000 and 35,000 d.w.t., with a draft of about 31 1/2 feet can enter port. The largest ship accommodated alongside would occupy a berth with a least depth of 34 feet. The largest tanker would occupy a berth about 450 feet long with about 30 feet alongside.

LANDMARKS

8B-16 See section 8B-6. A white tower on the eastern bank of the river below Five Whistles Corner is conspicuous from seaward. The churches of Gdansk, including St. Marien tower with a flat top, are prominent.

HARBOR

8B-17 See section 8B-7. The harbor, consisting of river quays, basins, and installations on Ostrow Island, stretches about 8 miles along the Martwa Wisla from Five Whistles Corner (sec. 8B-7), westward and southward of Ostrow Island, and eastward to Pleniewo Shipyard (54°21'N., 18°47'E.). General and bulk cargoes, oils, timber, grain, and shipbuilding are handled at the various quays and basins. The river, varying between 280 and 1,200 feet wide, is crossed by 4 bridges, 2 of which connect with Ostrow Island and open to permit passage of ships. A railroad and a swing bridge cross the river above the junction of the Martwa Wisla and Motlawa. Passenger and vehicle ferries cross the river southward of Five Whistles Corner to Nowy Port. A railroad ferry plys between Gdansk Shipyard and the mainland southeastward. Submarine cables, marked by notice boards at their landings, are laid across the channels. Beacons mark ferry landings.

Eight basins are located along the Martwa

Wisla. Basin Gorniczy, about 2/3 mile southward of Five Whistles Corner, is about 1/2 mile long and 20 to 32 feet deep. Bulk cargoes of coal and ores are transhipped by cranes with a capacity of 7 to 15 tons. Ostrow I, an artificial basin located at the northeastern part of Ostrow Island, is about 2,700 feet long and 21 to 45 feet deep. Ship repairs are made and floating drydocks are moored in the basin. Ostrow II, close westward, is a basin about 2,000 feet long, 17 to 26 feet deep, used for idle ship mooring. Grain Basin, on the western side of Ostrow Island opposite Gdansk Ship Repair Yard, is about 800 feet long and 13 to 26 feet deep.

There are two basins about 750 feet and 550 feet long, located 800 yards southward of the Grain Basin and close westward of the Motlawa, respectively. The basins are used for fitting out new ships constructed at Gdansk Shipyard, located along the southern side of Ostrow Island. At Pleniewo, two basins northward and southward of the shipyard, are used for the fitting out and repair of ships. The northern basin is about 700 feet long and about 7 to 13 feet deep; the southern, 950 feet long and 7 feet deep.

Ships can turn in areas about 30 feet deep located off the northern and southern ends of Ostrow Island. They can meet and pass at Five Whistles Corner. There are at least 5 fixed mooring berths at dolphins close offshore along the southern side of the river between Five Whistles Corner and Gorniczy Basin.

AIDS TO NAVIGATION

8B-18 See section 8B-6. Lights mark the channel between Nowy Port, Gdansk, and the entrances to rivers and basins. Numerous lights mark port installations and quays. Consult the chart and H.O. List of Lights No. 116.

PILOTS

8B-19 See section 8B-7.

ANCHORAGE

8B-20 See section 8B-8. There are no anchorage berths in the harbor.

DIRECTIONS

8B-21 See section 8B-8. Ships proceeding from Gdynia to Gdansk steer a course of 160°

from Buoy "GD" for about 5 1/2 miles, in a least depth of 7 fathoms, until the Brzezo Entrance Range is aligned, 196°, thence proceed as directed in section 8B-8.

FACILITIES

8B-22 Gdansk, a leading industrial and shipping center of Poland, is situated on the Martwa Wisla about 4 miles within the port entrance at Nowy Port. The Motlawa River flows through the center of Gdansk, a city with over 310,000 inhabitants, and a port of entry.

Exports include coal, coke, timber, cement, and a large tonnage of general cargo. Imports include ores, grain, fuel and vegetable oils, and fertilizers.

BERTHS.—Several quays and wharves line the sides of the Martwa Wisla between Five Whistles Corner and Ostrow Island. On the western side a petroleum wharf about 165 feet long with 26 to 29 feet alongside serves Oil Depot No. 1. Grain Quay adjoining the depot is 740 feet long with 18 to 21 feet alongside. Two disused granaries back the quay, now used for idle ship mooring. Vistula Station Quay, between the grain quay and Petroleum Pier No. 1, is 4,300 feet long with 27 to 33 feet alongside. General cargo, grain, ores, and fertilizers are handled. There are numerous cranes with capacities of 5 to 7 tons. Two grain unloaders discharge to a granary. Petroleum Pier No. 1 is 340 feet long with 26 feet alongside. It is an open pier with pierhead dolphins. Szczecin Wharf, an offshore wharf with corner dolphins, used for general cargo and timber handling, is 400 feet long and has 30 feet alongside. An adjoining pier about 250 feet long with 26 feet alongside has facilities for vegetable oils discharge and storage.

Gorniczy Basin opposite the northern end of Vistula Station Quay, is lined with quays. Ore Quay, along the southern side of the basin, is 2,450 feet long, with 29 to 30 feet alongside. Several 7 ton cranes and 15 ton transporters handle coal and ore. Coal Quay, on the northern side, is 2,840 feet long with 27 to 32 feet alongside. There are several 7 ton cranes. The Port Authority Office is located here. A quay at the root of the basin is 325 feet long, with 17 feet alongside, used by harbor craft.

Berthing facilities are interspersed along the Martwa Wisla opposite the western side of

Ostrow Island. Wislana Quay B, northwestward of Grain Basin, is a general cargo quay 310 feet long with 29 to 30 feet alongside. Northern Shipyard Quay, opposite the Grain Basin, is 890 feet long with 18 to 22 feet alongside. The Gdansk Shipyard, located on southern Ostrow Island and the mainland opposite, has several river quays. The quays, 700 to 1,040 feet long with 25 feet alongside, are served by 5 and 15 ton cranes.

The Martwa Wisla, eastward of the mouth of the Motlawa, has two river quays. Lumbermen's Quay, on the southern side is 2,500 feet long with 7 to 12 feet alongside. Krakow Quay, on the northern side, has berths 1,780 and 1,130 feet long with 9 to 13 feet alongside. Several repair quays at Pleniewo Shipyard have at least 7 feet alongside. Quays line the basins at Gdansk Ship Repair Yard. A quay along the western side of Ostrow I is 1,425 feet long with 18 feet alongside. The eastern side has a berth 2,750 feet long with 30 feet alongside.

Timber station wharf, opposite Vistula Station Quay, has berths 360 and 1,360 feet long with 27 to 28 feet alongside. Between the wharf and the entrance of Kanal Kaszubski is an Oil and Molasses Depot fronted by a pierhead about 225 feet long with dolphins extensions and 29 feet alongside. An adjoining Chemical Quay is 325 feet long with 20 to 23 feet alongside. Industrial Quay, on the eastern side of Kanal Kaszubski, is a fruit and general cargo quay about 1,450 feet long with 27 to 28 feet alongside. There are several 3 to 7 ton cranes on the quay which is being extended southward 1,500 feet and deepened to 33 feet. Kaszubski Quay, opposite the Industrial Quay, is used for ship repairs. It is 2,750 feet long with 20 to 24 feet alongside. Several 10-ton cranes serve the quay. Bytom Wharf, at the southeastern end of the Kanal, is 850 feet long with 20 to 22 feet alongside. There are several 5-ton transporters used for gypsum, sand and gravel handling.

There are numerous harbor tugs, lighters, and cranes, the latter with capacities of 3 to 30 tons. There are at least 8 floating cranes with capacities up to 120 tons. About 2/3 of the berths are served by the railroad.

SUPPLIES.—Provisions and ships' stores can be procured in quantity. Charts can be

bought and compasses adjusted. Potable water is piped to many of the berths. A water boat is available. Boiler water requires treatment. Ample fuel and diesel oil bunkers are available at oil berths or by oil barge on prior (5 days) notice.

REPAIRS.—All types of hull and machinery repairs can be made. Floating drydocks have lifting capacities of 3,500 tons. Vessels of 11,000 d.w.t. have been raised. A floating drydock over 700 feet long is capable of taking ships of 20,000 d.w.t. with a draft of 28 feet. There are floating cranes of 70 and 100 tons.

COMMUNICATIONS.—The port is connected with the general railroad system of the country. There are world-wide shipping connections. An international airport is located outside the city.

DERATTING.—See section 1-9.

MEDICAL.—There are hospitals and clinics available.

COASTAL FEATURES—LANDMARKS (Continued)

8B-23 The coast from Nowy Port trends southeastward for about 5 miles to the mouth of the Wisla Smiala, the eastern outlet of the Martwa Wisla. The fishing village of Gorki Wschodnie is located on the eastern side of the Martwa Wisla, about 1 mile inside the outlet. Sandy shoals of less than 3-fathoms fringing the coast, extend about 1 mile off the river mouth, where the shoal constantly shifts and breaks during onshore gales. An entrance channel, about 13 feet deep and marked by buoys in the summer, leads eastward of the sand spit. Storms cause shifting of buoys and changeable depths. Lighted Bell Buoy "GW-NE", moored close northeastward of the sand spit, is aligned with the entrance channel. Buoys mark the swept channel fairway between Nowy Port Anchorage (sec.8B-8) and the entrance channel.

The mouth of the Wisla Smiala is formed by an easterly breakwater and a westerly groin, with an entrance between about 150 feet wide. Lights are shown from the head of the breakwater and from each river bank inside the entrance. A fog signal is sounded near the western light.

Przekop Wisla, the main outlet of the Wisla (Vistula) River, empties into the sea

about 6 miles eastward of the Wisla Smiala entrance. The intervening coastal shoal extends about 1 mile off the river mouth, is constantly shifting and partly dry where the river deposits sand. Lighted Buoy "SWB" is moored in the approach to the river, about 1 1/4 miles northward of the entrance. Patches of 1 1/2 fathoms lie close eastward of the buoy and between the buoy and the entrance. A wreck, marked by a buoy close westward, lies sunk on the shoals near the entrance. Vessels entering the river pass westward of the lighted and wreck buoys.

Breakwaters, mostly destroyed, extend almost 1 mile seaward of the river entrance. The river, about 1/4 mile wide between breakwaters, leads to Swibno (54°20'N., 18°56'E.), a fishing harbor on the western side of the river. Swibno Light is shown from the root of the western breakwater. Lights are shown from the head of the western breakwater and from the fishing harbor entrance, about 1 mile southward of Swibno Light. Storm signals are hoisted close northward of the fishing harbor. A ferry from Swibno connects with a railroad at a village on the opposite shore.

The Przekop Wisla, southward of Swibno, is connected with the inland waterways system extending westward to Gdansk and eastward to Frisches Haff (sec. 8C-14).

Stegna Light (54°21'N., 19°07'E.), is shown on the coast about 6 miles eastward of Swibno. The few lighthouses and village church spires offer the only landmarks visible along the wooded sand dunes between Nowy Port and Stegna. The swept channel, about 1/2 mile wide and marked by buoys, lies 2 1/4 miles offshore. Buoys moored during the summer near the limits of the swept channel, aligned with two beacons ashore, denote measured mile distances. The limits of the distance area are marked by buoys, with a buoy moored about 2 miles northeastward of Swibno Light, marking the southwestern entrance.

MIERZEJA WISLANA, less than 1 mile wide, forms the low coast curving gradually northeastward for about 30 miles to Baltiysk. The 5 fathom curve parallels the coast about 3/4 mile offshore. Krynica Morska (Lysica) Light (54°23'N., 19°27'E.), is shown from a sand hill about 12 miles eastward of Stegna Lighthouse. A fog signal is sounded

and a radiobeacon transmits close north-westward of the lighthouse. Storm signals are hoisted close northeastward. Piaski and Scukinskij Lights are shown on the coast about 6 1/2 and 13 miles northeastward of Krynica Morska, respectively. Submarine cables from Nowy Port are landed about 2 miles northeastward of Piaski.

Several areas, best seen on the chart, in which it is prohibited to enter, anchor, or fish, lie off Mierzeja Wislana. An area about 6 to 8 miles westward of Baltiysk is used for mine-laying practice.

ANCHORAGES

8B-24 SOPOT.—Anchorage, with offshore winds, can be taken in 5 to 7 fathoms, sand and clay, about 4 miles off Sopot (sec. 8B-5).

NOWY PORT.—See section 8B-8.

GDANSK.—See section 8B-20.

PART C. BALTIYSK TO MYS TARAN

8C-1 Baltiysk is located on the eastern side of the Gulf of Danzig opposite Baltiyskaya Kosa, at the northern extremity of Mierzeja Wislana (sec. 8B-23). A detailed description of Baltiysk is given in section 8C-6.

COAST—GENERAL

8C-2 The coast in the vicinity of Baltiysk is very low, with the wooded groves on the coastal spit appearing as islands. Between Baltiysk and Mys Taran, a point about 2 mile northward, the terrain backing the shore rises gradually becoming steep and cliffy in the northern part. The coast to Zaltniken, about 9 miles northward of Baltiysk, consists of low, wooded sand dunes fronted by a sandy, coastal shoal extending less than 1 mile offshore. Northward of Zaltniken, the coast rising to cliffs appears yellow in color, with rocky shoals extending up to 2 miles offshore. A wooded eminence about 290 feet high, is a prominent feature rising 6 miles southward of Mys Taran.

DEPTHS—DANGERS

8C-3 See section 8-1. There are no dangers seaward of the 10-fathom curve which parallels the coast about 2 miles offshore. RESTRICTED AREAS lie northward and south-

ward of Baltiysk extending about 8 miles seaward. Fishing nets are laid in coastal waters up to 5 miles offshore throughout the year.

NAVIGATION

8C-4 See sections 8-2, 8B-4. Approach Lighted Whistle Buoy No. 1, with a radar reflector, is moored in about 54°43'N., 19°40'E., at the entrance of the swept channel leading to Baltiysk. From the swept channel about 2 1/4 miles northward of Stegna Light (sec. 8B-23), a course of 051° for about 27 miles leads to the whistle buoy.

CURRENTS—TIDAL CURRENTS

8C-5 Tides are negligible. Southwesterly to northwesterly gales in the Baltic cause a current to flow northward at a velocity up to 4 knots along the seaward side of Mierzeja Wislana. This current, meeting the outbound current flowing into the Baltic by Baltiysk, raises a rough sea off the harbor entrance. Northwesterly to northeasterly gales cause a current to flow southward across the entrance.

BALTIYSK (54°38'N., 19°54'E.)

8C-6 Baltiysk is a naval base located at the southern end of a peninsula forming the western side of Primorskiy Zaliv, a shallow bay adjacent to the port. Baltiysk, the outport for Kaliningrad, a city about 22 miles eastward, is restricted to foreign ships, unless authorized, and has little commercial importance.

NAVIGATION.—See section 8C-4. From the Approach Lighted Whistle Buoy, moored at the entrance of the swept channel, a course of 122° for 8 1/2 miles leads to the harbor entrance over a least charted depth of 34 feet.

WINDS—WEATHER.—Gales from northeast through east to southwest may lower the water level 3 1/4 feet; opposing winds may raise the level about 3 feet. Winds in the Baltic and a heavy outflow from inland rivers influence water levels. There is a water gage on the wharf in the pilot harbor.

ICE.—Ice appears in the harbor between December and March. The port is always kept open by icebreakers unless fixed ice forms in the Baltic. The entrance to port seldom freezes over due to the strong outgoing

current. For 3 or 4 days during the spring thaw ice conditions make the port entrance hazardous for normal port operations.

CURRENTS.—Currents flowing in and out of the harbor fairways are dependent on wind force and direction. Currents are very variable during each day. When northerly winds are blowing in the upper Baltic and southerly winds around Baltiysk, a strong incoming current flows into the port and inland waters.

DEPTHS—DANGERS.—The approach channel, a continuation of the swept channel extending about 1/2 mile seaward of the breakwaters, has a depth of about 34 feet. The entrance channel, leading between breakwaters, is about 1 mile long, 370 yards wide, with a controlling depth of 31 feet. The controlling depth in the fairway leading to principal basins is 30 feet. There is some silting in channels which is minimized by a strong current and dredging.

Shoals of about 5 fathoms lie near the approach fairway. Shoals of less than 2 fathoms fringe the breakwaters and shores of the harbor. Wrecks lie sunk in the approach channel, eastward and westward of the fairway. A dangerous wreck, marked by a lighted buoy close westward, lies about 1 1/4 miles northward of the northern breakwater head. Submarine cables are laid from the root to the head of the southern breakwater, across the channel northeastward to the opposite shore, and to the Inner and Oil Harbors.

LIMITATIONS.—The largest ship to enter port is limited by berthing dimensions and a controlling depth of 30 feet in the fairway.

ASPECT—LAND MARKS.—The harbor fronts the southern part of town, with channels and basins dredged out of low, marshy terrain. Approaching port the lighthouse standing at the southern part of town and a signal/watch tower close westward are conspicuous, as are the front range beacon with signal mast. Standpipes in town and a steep, yellow height about 1 mile eastward are prominent.

8C-7 HARBOR.—Baltiysk, protected from the sea by two breakwaters extending north-westward, consists of several artificial harbors and basins, a Seaplane Basin on the northeastern side of Baltiyskaya Kosa and Kamstigall Basin, about 1 1/2 miles eastward of the main port area. Military regulations

are enforced throughout the port and adjacent areas. There are general depths of 18 to 34 feet in the harbor.

The Outer Harbor, lying at the inner end of the entrance fairway, about 300 feet wide, has depths of 10 to 31 feet. Ships can turn in an area about 1,100 feet wide. Ferries ply across the Outer Harbor between landings at the northeastern corner of Baltiyskaya Kosa and Town Quay, at the entrance of the fishing basin. Petroleum Harbor, with depths of 18 to 30 feet, lies close eastward of the Outer Harbor.

The Inner Harbor, leading northward from the Outer Harbor, is 260 feet wide with depths of 18 to at least 25 feet. Lighter Basin leads off the western side. Rear Harbor, opening northeastward of the Inner Harbor, contains a shipyard and fishing basins with depths of 7 to 21 feet, respectively, along the eastern and southern sides of the Inner Harbor. The remainder of the harbor has depths of 18 to 22 feet. Works Harbor, at the eastern entrance of the Inner Harbor, has an entrance about 85 feet wide with inner depths of 18 to 28 feet. The inner part of the harbor is used for floating timber storage; the outer part has shipyard and repair facilities. Fishing Basin, at the western entrance of the Inner Harbor, has depths of 18 to 30 feet. It is fronted by Breakwater and South Town Quays.

Naval Harbor, lies eastward of Petroleum Harbor. The entrance fairway depth leading to the several basins in the harbor is 30 to 34 feet with a controlling depth of 30 feet. The entrance is 420 feet wide leading to a turning area 1,250 feet in diameter. A ferry pier is located at the western side of the entrance.

Kamstigall Basin, lying close eastward of a shipyard and about 3/4 mile eastward of the Naval Harbor, has a least depth of 10 feet with an entrance about 100 feet wide.

Seaplane Harbor, on the northeastern side of Baltiyskaya Kosa and about 1/2 mile southward of the main harbor entrance, has an entrance 850 feet wide leading between breakwaters to a large turning basin with a depth of 8 feet. Seaplanes are serviced in the harbor.

SIGNALS.—A naval signal and radar station is located close northward of the Fishing Basin in the Outer Harbor. Pilot signals are

displayed from a watch tower close westward of the main lighthouse. Storm and traffic signals are hoisted from a signal mast at the front entrance range beacon. The storm signals are International; traffic signals are the same as described for Gdynia (sec. 8A-14).

AIDS TO NAVIGATION.—Baltiysk Lighthouse (54°38'N., 19°54'E.), stands near the Fishing Basin in the southern part of town. The Front Entrance Range Light is shown from a beacon standing about 800 yards northwestward of Baltiysk Light. These lights in range, 122°, lead through the approach channel to the breakwaters. Lights are shown from the head of the northern and southern breakwaters. A fog signal is sounded at the former. A submarine oscillator is sounded in the channel about 1 1/4 miles northwestward of the northern breakwater head. Lights are shown from the head of a short breakwater forming Fishing Basin in the Outer Harbor and from the opposite shore of Baltiyskaya Kosa. Lights are shown from moleheads forming Petroleum Harbor. Lights in Range, 131°, shown from the western head of the southern mole of the harbor and from a molehead about 1/4 mile southeastward, lead through the entrance channel to the Outer Harbor.

PILOTS.—Pilotage is compulsory. Pilots can be obtained by day or at night in the seaward approach to port. International pilot signals are used. If bound for Kaliningrad at least 12 hours notice prior to E.T.A. is required by radio. When weather conditions prevent the boarding of a pilot, but are considered favorable for entry into port, a large, red flag, is displayed aboard the pilot vessel indicating the incoming ship is to follow the pilot vessel into port. The same signal displayed at the watch tower (sec. 8C-6) and entrance range beacon indicates a pilot is not available.

8C-8 ANCHORAGE.—Anchorage can be taken off Gdynia (sec. 8A-17), or Gdansk (sec. 8B-8). Temporary anchorage can be taken in the Outer Harbor, clear of the fairway, in about 5 fathoms, hard sand. Ships with a draft up to 24 1/2 feet can anchor.

PROHIBITED anchorages enclose the approach channel extending at least 2 miles northward of the breakwaters, also in the

approach and entrance to the Naval Harbor.

DIRECTIONS.—See section 8C-4. From the Approach Buoy, steer a course of 122° for 8 1/2 miles on the Entrance Range (sec. 8C-7), passing Lighted Buoy No. 2 close aboard. With northwesterly gales and southerly current setting across the channel on entering, it is advisable to keep to the northern side of the channel. With southwesterly and westerly gales a heavy sea and swell runs in the channel.

From the breakwater entrance steer 131° on the range (sec. 8C-7) through the entrance channel, keeping on the northern side of the Outer Harbor, until the northern molehead of the Petroleum Harbor is closed. Thence steer various courses to berths in the main harbor.

8C-9 BALTIYSK, a naval base located at the seaward entrance of Vislinskiy Zaliv (sec. 8C-14), has a population of about 25,000, mainly engaged in military and support activities. A small fishing industry is conducted and minor ship repairs can be made. There is a Hydrographic Office in the Inner Harbor and ships bound for Kaliningrad can obtain customs clearance.

BERTHS.—Breakwater Quay, about 500 feet long with 19 feet alongside, fronts the Fishing Basin in the Outer Harbor. Fishing Basin Quay has 3 berths, the longest 140 feet with 19 feet alongside. South Town Quay, adjacent to the Fishing Basin, is 750 feet long with about 30 feet alongside.

Inner Harbor and Rear Harbor are quayed along the western side. A quay 800 feet long with 19 feet alongside fronts the entrance to the inner harbor. Railroad Quay, extending along the rear harbor, is about 5,200 feet long with 23 to at least 25 feet alongside. This quay is served by the railroad and has at least 2 cranes of 3 to 5 tons capacity. The Fishing Basins in the rear harbor have berths 325, 365, and 520 feet long with 16 to 23 feet alongside. There are cranes of 3 to 5 tons available. Russian Quays, at the eastern entrance of the inner harbor, has several berths up to 690 feet long with 23 to at least 25 feet alongside.

Works Harbor has a repair quay on the western side about 1,160 feet long with 16 to 19 feet alongside. The eastern side of the har-

bor has breasting platforms along a length of 1,100 feet with 10 to 19 feet alongside. The outer quays are 625 feet long with 10 to 18 feet alongside.

Kamstigall Basin has two quays about 385 feet long with 13 to 19 feet alongside. Seaplane Harbor Wharf has a berthing length of 550 feet with 10 feet alongside.

Basins 1 and 2, Work Basin, and Kamstigall have railroad connections. Numerous tugs are available. There are several floating cranes, the largest of 350-tons capacity.

SUPPLIES.—Bunkering facilities and provisions are available only to naval ships and craft. Water is piped to the quays.

REPAIRS.—Minor repairs to hull and machinery can be made at the Rear and Work Harbors for commercial vessels. There are two floating drydocks, the largest of 1,500-tons lifting capacity.

COMMUNICATION.—The port and town is connected by railroad with Kaliningrad and the interior. There are marine connections with ports in and adjacent to the Gulf of Danzig during the summer.

DERATTING.—See section 1-13.

MEDICAL.—A hospital serves the port.

KALININGRAD (54°42'N., 20°30'E.)

8C-10 Kaliningrad is a river transshipment port, an important industrial city, and a base for the Atlantic fishing fleet. The harbor lies about 4 miles above the mouth of the Pregolya River which flows into Kaliningradskiy Zaliv, the northeastern part of Vislinskiy Zaliv (sec. 8C-14).

NAVIGATION.—See sections 8C-4, 8C-6.

WINDS—WEATHER.—Westerly winds, in conjunction with spring floods, may raise the water level about 6 feet above the mean; strong easterly winds lower the level 4 feet. Tidal rises are insignificant.

ICE.—The harbor and approaches thereto are frozen during the ice season, but are kept open by icebreakers.

CURRENTS.—See section 8C-6. Cross-currents are experienced in open stretches and openings in the approach canal leading to Kaliningrad.

DEPTHS—DANGERS.—Kaliningradskiy Morskoy Kanal, the main approach channel to Kaliningrad, has a controlling depth of 26 feet. A secondary channel, for vessels with local

knowledge and a maximum draft of 9 1/2 feet, leads through buoyed channels marked by ranges, to Kaliningrad. Numerous dangers associated with the secondary channel can be seen on the chart. Dangers approaching the main channel include fringing shoals enclosing the southern mole of Petroleum Harbor (sec. 8C-7). Buoys mark the outer edge of the shoal. Submarine cables laid in the approach are best seen on the chart. A 3-fathom patch lies in the approach, about 1/4 mile westward of the channel entrance. A dangerous wreck lies in 54°39'N., 20°04'E., at the southern edge of the channel.

LIMITATIONS.—The largest cargo ship to enter port is limited to a draft of 24 feet by a controlling depth of 26 feet in the channel and alongside a berth. The largest tanker berth has a depth alongside of 24 feet.

CHANNELS.—Kaliningradskiy Morskoj Kanal, entered close southward of the Naval Harbor at Baltiysk, is a channel about 17 1/2 miles long leading to the mouth of the Pregolya. A least depth of 26 feet may be reduced about 1 foot by silting, requiring periodic dredging. The channel is formed by training walls consisting of sheet piling with stone filling stretching almost the entire length on the southern side. Several openings in the training wall are used by fishing vessels as passages leading to local harbors on the mainland. The eastern half of the entrance to Primorskiy Zaliv (sec. 8C-6) has no wall and is open to the bay. Between training walls the channel is at least 150 feet wide, with wider sections for passing situations. Much of the southern wall has plantings of trees and bushes on embankments.

The secondary channel leads southeastward, in about 13 feet, from Baltiysk entrance channel to Nasypnoy Lighted Beacon (54°36'N., 19°56'E.). Range Lights, 327°, astern, shown on the northern extremity of Baltiyskaya Kosa, lead through the approach channel. From Nasypnoy Light, the channel leads east-northeastward for about 7 miles to Payzer-Vikkopf Lighted Buoy, moored at the southern edge of a shoal extending about 1 1/4 miles offshore. Range Lights, 076°, shown near the mouth of the Pregolya, lead to the river entrance. The secondary channels and adjacent dangers are marked by buoys.

8C-11 HARBOR.—Kaliningrad, a natural river harbor, consists of Outer and Inner Harbors divided by a railroad-highway bridge. The Outer Harbor is formed by about three miles of the Pregolya and Basins III, IV, V, all used by the fishing fleet, dry and bulk cargo ships, shipbuilding and repairing industries. The river has depths of 22 to 28 feet, with a controlling depth in the fairway of 26 feet to the railroad bridge. The largest turning area is about 1,000 feet wide with a least depth of 26 feet. The Inner Harbor consists of a short section of the Pregolya and longer sections of its two branches, Novyy and Staryy Pregolya. The river section is about 1/2 mile in length with depths of 7 to 17 feet. The branches are each about 2 1/4 miles in length with depths of less than 17 feet. The sides of the river are quayed to its branches which are spanned by several drawbridges. Cargo transfer and repairs to small vessels are conducted along the branches which are joined to the inland waterways system.

The three basins in the Outer Harbor are contiguous on the southern side of the river. Basin V, the outermost, is about 1/2 mile long, partly quayed, with shoals extending off the quays. Mooring dolphins mark the outer edge of the shoals. The fairway between shoals exceeds a depth of 18 feet. Fishing vessels berth at the eastern side and lumber is unloaded at the western side of the basin. Oil bunkering piers extend off the root of the basin. Basin IV, about 2/3 mile long, has depths of 24 to 27 feet. The western side is fringed by shoals marked by dolphins at the outer edge. Quays front most of the basin. Bulk cargoes including grain are handled at the eastern quay. Bulk and general cargoes are handled at piers and wharves along the western side. A fishing quay forms the basin head. Basin III, entered about 2/3 mile westward of the railroad bridge, is about 1/2 mile long, with depths of 24 to 27 feet. Quays line the basin. The western side is devoted to general cargo and bulk grain; the eastern to general cargo. The customhouse is nearby.

The northern side of the river is fringed by shoals marked by dolphins. Numerous wharves and piers front industrial plants. General cargo and bulk grain are handled

There are oil bunkering piers. Fishing wharves are located near the bridge. Ship repair yards are located opposite, and extend westward, of Basin V. Quays fronting both sides of the river in the Inner Harbor handle lumber, general cargoes and bulk grain.

SIGNALS—REGULATIONS.—Traffic signals are hoisted on the watch tower at Baltiysk (sec. 8C-6), and from signal masts located at various stations along the northern side of the main channel. Green shapes displayed on yardarms by day and green lights shown at night, vertical, indicate the tonnage and draft of the four classes of ships permitted to transit the channel. Spherical signals at the yardarm nearest the channel refer to east-bound traffic; conical signals on the opposite yardarms refer to west-bound traffic. Three green shapes or lights indicate the channel is open to all ships. At all stations the "Stop" signal is a red flag or red light.

Storm signals are hoisted at Payze (54° 40'N., 20°06'E.) and at the southern side of the Pregolya entrance.

REGULATIONS.—Permission of the naval authorities at Baltiysk must be obtained by foreign ships for transit of the channels to Kaliningrad. A copy of the latest regulations, available locally, contains vessel classification, charges, right-of-way, passing areas, signals, speed allowed and use of tugs.

AIDS TO NAVIGATION.—The northern side of the main channel is marked by black buoys numbered from west to east; the southern side, except at the western end, is marked by lettered buoys. Currents and ice may cause buoys to be unreliable. Dolphins stand close inside the western entrance to the channel. Lights on towers are shown from each side of the entrance channel. Lighted beacons and dolphins mark the sides of the main channel fairway. Passages leading through the training walls to local harbors are marked by range lights, also bends in the channel including the mouth of the river leading to Kaliningrad.

8C-12 PILOTS.—See section 8C-7. Pilots can be obtained at Kaliningrad. The Harbor Office is located at the root of Basin III. Tugs are required to accompany ocean going ships between Baltiysk and Kaliningrad.

ANCHORAGE.—See section 8C-8. There are no designated anchorages or fixed moor-

ings in the approaches to, or within Kaliningrad Harbor. Numerous dolphins along the river sides, at basin entrances and between drawbridges can be used in emergencies. Anchorage is prohibited in the western approach to and in the main channel. Consult the regulations.

DIRECTIONS.—See section 8C-8. From close westward of the lights marking the western moleheads of the Petroleum Harbor, steer various courses in midchannel to pass between the lighted towers at the entrance of the main channel.

8C-13 KALININGRAD, a port of entry, with about 250,000 inhabitants, is engaged in manifold industrial activities. The port is an important link between Western Europe and the U.S.S.R. A river port, it is connected with the interior by its branches and an inland waterways system. Coastwise vessels enroute to Klaipeda frequently use this route.

BERTHS.—Western Quay of Basin V is about 1,700 feet long with 7 to 10 feet alongside. The combined Fishing and Eastern Quays are 3,300 feet long with 23 to 27 feet alongside. Basin IV has a fishing quay 700 feet long with at least 10 feet alongside. Wharves in the basin extend to 450 feet with 23 feet alongside. Granary Quay is 3,800 feet long with 23 to 27 feet alongside. Basin III has a Customs Quay 2,400 feet long with 24 to 26 feet alongside. Eastern Quay is 1,600 feet long with 23 to 26 feet alongside. Railroad Quay, on the southern side of the river between Basin III and the railroad bridge, is 2,450 feet long with 19 1/2 to 23 feet alongside. Several river berths in the Inner Harbor are 1,500 to 2,000 feet long with 16 to 17 feet alongside. On the northern side of the river in the Outer Harbor, are numerous berths with 13 to 22 feet alongside. A wharf opposite Basin III is a passenger facility about 1,040 feet long with 15 to 16 feet alongside. Oil piers, 220 feet long have 16 feet alongside. Granary Wharf, opposite Basin IV, is 2,100 feet long with 20 to 23 feet alongside. Cellulose Plant Wharf, opposite Basin V, is 2,200 feet long with 20 to 23 feet alongside.

Most of the berths on the southern side of the Outer Harbor and near the western end of the Inner Harbor have railroad connections. The 2-level railroad and highway bridge

serves some berths on the northern side of the river. Numerous cranes of 1 1/2-to 10-tons capacity are available. There are several floating cranes of 15-to 25-tons capacity. Numerous tugs and lighters are available.

SUPPLIES.—Provisions and stores can be procured. Water is piped to some quays. Diesel and fuel oils are available at some oil berths. Water and oil barges are also available.

REPAIRS.—There are several shipyards and repair yards. Major repairs can be made. Graving docks at least 500 feet long and several floating drydocks, the largest of 5,000-tons capacity, are available. There are several cranes with capacities up to 50 tons.

COMMUNICATIONS.—There is a radio station. The port and city are connected by railroad with the U.S.S.R. and Polish rail systems. Shipping is conducted with Baltic and North Sea ports.

DERATTING.—See section 1-13.

MEDICAL.—There are hospitals and clinics in the city.

ZALEW WISLANY or VISLINSKIY ZALIV

8C-14 FRISCHES HAFF, the common name for Zalew Wislany (Polish) or Vislinskiy Zaliv (Russian), is a gulf about 50 miles long and 5 miles wide separated from the Gulf of Danzig by Mierzeja Wislana (sec. 8B-23) and Baltiyskaya Kosa (sec. 8C-1). Zalew Elblaski, into which several rivers discharge, is the southwestern part of the gulf. Kalinin-gradskiy Zaliv, the northeastern part of the gulf, extends to the mouth of the Pregolya River. Primorskiy Zaliv indents the northern side of the gulf near Baltiysk (sec. 8C-6).

NAVIGATION.—See sections 8C-4, 8C-6.

WINDS-WEATHER.—The water level in the gulf is dependent on the wind and varies considerably. Prolonged northeasterly winds raise the level in the southwestern part of the bay and adjacent rivers between 2 1/2 and 3 feet. Strong westerly winds lower the level.

ICE.—The entire gulf is frozen during the winter season. Navigation is stopped except in the main channel to Kaliningrad (sec. 8C-10). Buoys are removed. Vehicles often cross the gulf over the ice. The river currents in the western part of the gulf causes

the ice to break-up and move seaward before that in the eastern part.

DEPTHS-DANGERS.—General depths in Frisches Haff are 1 1/2 to 2 1/2 fathoms, with the maximum, 2 3/4 fathoms, southeastward of Baltiysk. The bottom consists of soft clay and mud mixed with sand. A coastal shoal of less than 1 fathom extends about 3/4 mile offshore in many places. The shoal has a hard bottom covered by silt. In other areas, coastal shoals of hard sand with large boulders and stones extend about the same distance offshore. Coastal marshes and reeds fill many bights. There are numerous wrecks and derelicts scattered throughout the gulf, mostly unmarked. Vessels should strictly adhere to prescribed and charted fairways.

A fairway about 9 feet deep, marked by lighted buoys and beacons, leads southwestward from Nasypnoy Light (sec. 8C-10) through the center of Frisches Haff. Secondary channels, marked by range lights lead from the fairway buoys to many of the local harbors.

ASPECT-LANDMARKS.—The northern shore is densely wooded. The eastern shore is cultivated, backed by high land which closes the coast in places. Various churches serve as landmarks, especially the cathedral at Frombork (54°22'N., 19°41'E.). Krynicka Morska Lighthouse (sec. 8B-23) is also a conspicuous landmark.

HARBORS.—There are several harbors located at or near the mouths of rivers flowing into Frisches Haff. Silting is common requiring frequent dredging. Customs inspections occur near the fairway buoys in the center of the gulf. Most of these harbors are home ports for local fishermen. The harbor approaches and entrances are marked by range lights, buoys, and protected by breakwaters. The general depths are 6 feet. Local knowledge is necessary. Storm signals are hoisted at some harbors.

ELBLAG (54°10'N., 19°24'E.), a port at the southeastern end of the gulf, is located about 6 miles above the mouth of the Elblag River. The harbor is connected by the river and inland waterways with Danzig and interior towns. The harbor consists of four basins, 10 to 13 feet deep. The fairway leading to port is 8 feet deep. Vessels with a draft of

feet can enter port. Buoys and lights mark the entrance, river channels, and heads of the breakwaters at the river mouth.

PILOTS.—Pilotage is compulsory with certain exemptions, throughout Frisches Haff. Pilots can be obtained at Baltiysk and Kaliningrad (sec.8C-7).

DIRECTIONS.—See sections 8C-8, 8C-10. From Nasypnoy Light Beacon (sec.8C-10) steer about 223° in midchannel through the Gulf for Fairway Buoys No. 10 and "FRO", the latter lighted and moored in 54°24'N., 19°39'E. Thence steer 240° for about 9 miles to Elblag Lighted Beacon, standing at the junction to several channels, including Elblag.

COAST (Continued)

8C-15 The coast northward of Baltiysk (sec.8C-1), is described in section 8C-2. Foul ground extends 1-mile offshore and about 3 miles northeastward of Baltiysk

northern breakwater. A wreck, marked by a lighted buoy, lies sunk close northward of the foul area. A Measured Distance about 5 1/4 miles long, marked by buoys, terminates 2 3/4 miles northward of Baltiysk Approach Buoy (sec.8C-4).

Yantarnyy, a coastal village with nearby amber mines, is located about 13 1/2 miles northward of Baltiysk. Factory smokestacks and working arc lights are prominent. Storm signals are hoisted near the village. A prominent beacon stands on a cliff about 2 1/4 miles southward of Yantarnyy. Rocky 2 to 3 fathom shoals extend 1 1/2 to 2 miles offshore between the village and Mys Taran, about 6 miles northward.

ANCHORAGES

8C-16 BALTIYSK.—See section 8C-8.

KALININGRAD.—See section 8C-12.

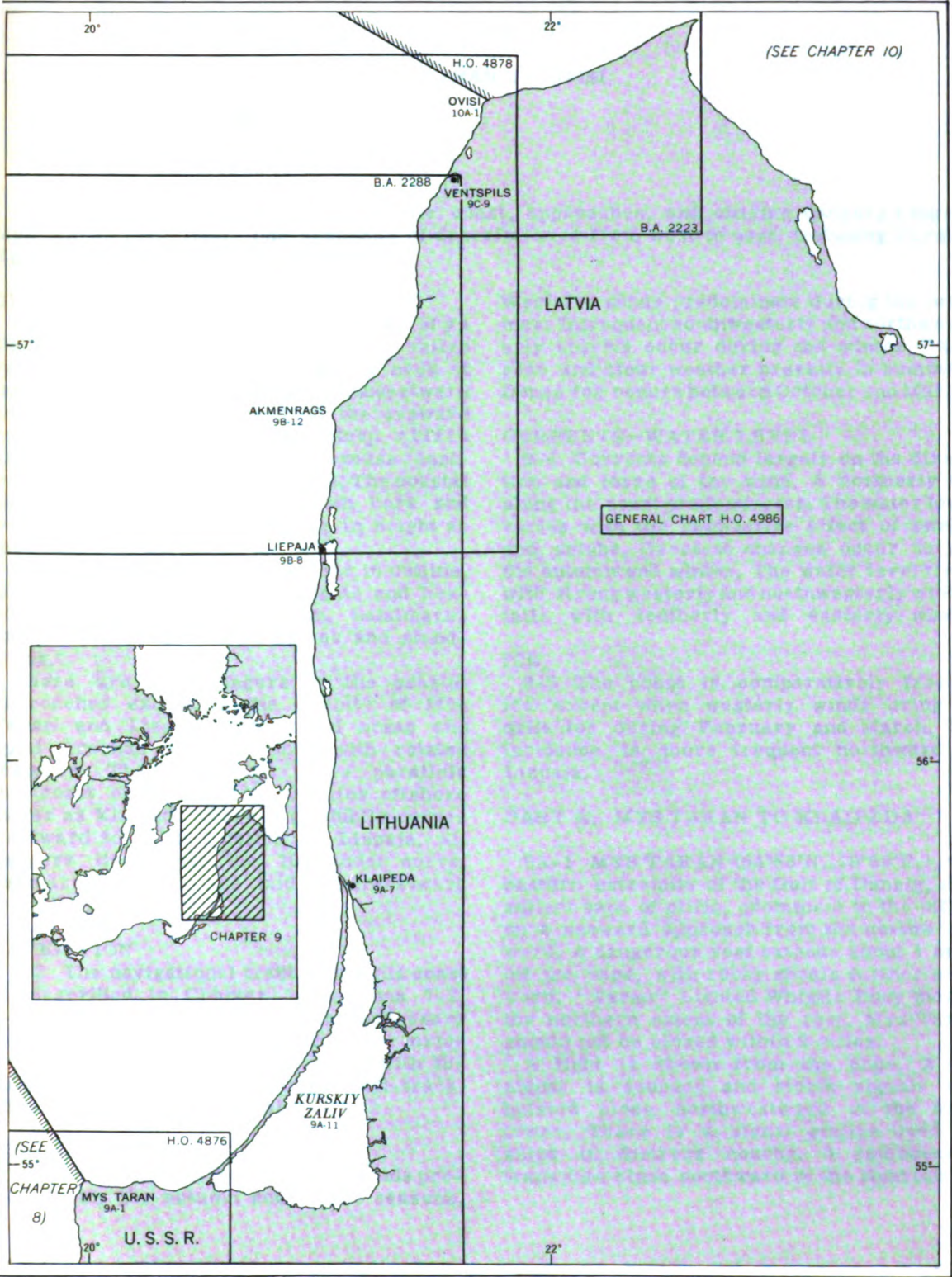


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 9—GRAPHIC INDEX

CHAPTER 9

MYS TARAN TO OVISI

PART A. Mys Taran to Klaipeda

PART B. Klaipeda to Akmenrags

PART C. Akmenrags to Ovisi

Plan.—This chapter describes the coast, approaches, and offlying dangers between Mys Taran and Ovisi. The sequence of description is from west to east, including Kurskiy Saliv, thence northward to Ovisi.

GENERAL REMARKS

9-1 The coast turns abruptly at Mys Taran and continues for about 19 miles eastward where it joins a narrow neck of land which curves gradually northeastward and northward terminating at the seaward approach to Klaipeda. The steep cliffs around Mys Taran gradually decrease eastward and become wooded heights. The coastal neck is low, consisting of both bare and wooded sand dunes, increasing in height as they extend northward.

This stretch of coast is regular in outline, unbroken, with only a few lights and beacons to aid local fishermen. Landmarks are few, mainly church spires and standpipes.

There are few dangers in the coastal approaches except in the vicinity of Mys Taran and Liepaja. Prohibited areas and spoil grounds are described with related features. The 10-fathom curve parallels the coast about 1 1/4 to 2 miles offshore as far as Klaipeda where it gradually curves westward to about 7 miles off Liepaja. All dangers lie inside the 10-fathom curve. Submarine cables are laid southwestward from Liepaja.

NAVIGATION

9-2 The navigational track along this coast is described in Chapter 1. Sections 7-2, 8-2 provide related information necessary to approach port safely. Directions for major ports along this coast are given with the port and tie-in with the navigational track. NEMEDRI should be followed.

WINDS—WEATHER

9-3 Southerly and southeasterly winds prevail during the autumn and winter seasons.

Westerly winds predominate during the summer. Infrequent southwesterly and northwesterly storms occur during the winter. Calm seas and clear weather prevails in summer. Dense fog occurs between October and March.

CURRENTS—WATER LEVEL

9-4 Currents depend largely on the direction and force of the wind. A northerly set along the coast predominates. The water level varies with the cumulative effect of swells and seiche. Greatest changes occur during the autumn and winter. The water level rises with strong westerly and northwesterly winds; falls with southerly and easterly winds.

ICE

9-5 The coast is comparatively free of ice except when westerly winds bring in drift ice during February and March. Ice incidence is more frequent northward of Liepaja.

PART A. MYS TARAN TO KLAIPEDA

9A-1 MYS TARAN (54°58'N., 19°59'E.), the eastern extremity of the Gulf of Danzig, is a salient cape of cliffs, prominent in the offing on a seaward approach from the northwestward. A dangerous reef extends about 1 mile off the cape, with rocky shoals further seaward. "Taran" Lighted Whistle Buoy marks the northern extent of the reef. Mys Taran should not be closed within 2 miles.

A light is shown from the cape. A fog signal is sounded and storm signals are hoisted close northwestward of the light tower. There is a signal station used for ships in distress nearby. A radiobeacon transmits close southward of the light tower.

Currents at Mys Taran and northward of the cape set westward with a velocity of about 2 knots.

COAST—GENERAL

9A-2 See section 9-1.

DEPTHS—DANGERS

9A-3 There are no off-lying dangers. The depths decrease gradually shoreward, with the 5-fathom curve running parallel to the coast about 1/2 mile offshore.

Prohibited areas extend about 10 miles offshore between Nida (55°18'N., 21°00'E.), and a position on the coast about 11 1/2 miles northward of Nida, also about 4 miles offshore between Juodkrante Beacon (55°32'N., 21°07'E.), and a coastal position 6 miles northward.

NAVIGATION

9A-4 From a position on the track about 5 miles northward of Rozewie (sec. 7D-19), a course of 063° for about 103 miles leads in deep water to Fairway Lighted Whistle Buoy No. 1, moored about 3 1/4-miles westward of the entrance to Klaipeda (sec. 9A-7).

COASTAL FEATURES—LANDMARKS

9A-5 BETWEEN MYS TARAN AND ZELONOGRADESK (54°58'N., 20°29'E.), a bathing resort about 17 1/2 miles eastward, the partly wooded coast decreases in steepness and height. The most conspicuous landmarks are a church at Primor'ye, about 2 1/4 miles southeastward of Mys Taran and standpipes 2 to 4 miles further eastward.

PIONERSKIY, a fishing harbor about 8 miles eastward of Mys Taran, is formed by two breakwaters and an elbow extension at the entrance, about 3 fathoms deep. Lights are shown from the breakwater heads and extensions. A fog signal is sounded at the seaward end of the outer breakwater. Range Lights, 175°, shown near the entrance, lead close westward of a Fairway Whistle Buoy moored about 2 miles northward of the harbor, and close eastward of the breakwater head. Storm signals are hoisted at the harbor entrance. Range lights lead through the entrance to an inner harbor about 12 feet deep.

Mys Gvardejskiy, a point from which a light is shown, is located about 2 miles eastward of Pionerskiy. A spoil ground, about 1 mile square, lies nearly a mile eastward of the point.

Zelonogradsk, a village about 7 miles eastward of Mys Gvardejskiy, has a prominent church, with a standpipe about 1 3/4 miles northeastward. The harbor has silted and is seldom used. A tide gage stands about 1/2 mile northwestward of the church.

9A-6 KURSKAYA KOSA, a narrow neck or peninsula, forms the coast for about 52 miles between Zelonogradsk and Klaipeda. The neck consists of a series of white, sand dunes, partly wooded, prominent from offshore. Lights are shown at Lesnoy and Rybachiy, about 6 and 18 miles northeastward of Zelonogradsk, respectively. Nida (55°18'N., 21°00'E.), a fishing harbor entered from the eastward, has a conspicuous church steeple. A light is shown, a fog signal sounded, and storm signals are hoisted near the harbor (sec. 9A-11). A prominent framework slatted beacon stands about 9 1/2 miles northward of Nida. Juodkrante Light is shown from a tower, with a radar reflector, standing about 15 1/2 miles northward of Nida Light. Prohibited areas are described in section 9A-3.

KLAIPEDA (55°43'N., 21°07'E.)

9A-7 Klaipeda, also known as Memel, is a commercial port located on the inner shore eastward of the northern extremity of Kurskaya Kosa. The harbor is an important transshipment center for imports from East Germany and the Scandinavian countries.

NAVIGATION.—See section 9A-4.

WINDS—WEATHER.—The water level seldom changes more than 1 foot from mean sea level. Strong westerly, northerly, and northeasterly winds raise the level; easterly and southerly winds lower the water level. The first situation, if prolonged, causes heavy surging at the quays forcing ships to depart the harbor and anchor to await more favorable weather conditions.

ICE.—Ice may impede navigation between late December and the end of March. Ice-

breakers and tugs keep the port open. Drift ice may close the harbor at times, but only until the current and wind combine to set the ice into the Baltic. Heavy snowfall, and storms causing icing of the quays, curtail shipping.

TIDES—CURRENTS.—Tides are insignificant. The prevailing current sets northward across the seaward approach and entrance to Klaipeda. It may attain a velocity of 2 knots. Northerly winds cause a southerly current.

DEPTHS—DANGERS.—The approach fairway leading from Fairway Buoy No. 1, with radar reflector (sec. 9A-4), is about 265 feet wide and at least 27 1/2 feet deep. The channel for about 1/3 mile seaward of the breakwater entrance is subject to constant silting, especially during spring floods or prolonged northerly and northwesterly storms. During these conditions the approach range does not always lead through deepest water. Dredging is periodically carried out.

MORSKOY KANAL, the entrance channel, leads between the head of the northern and southern breakwaters for about 4 miles to Iekluma Kiaules Nugara, a sandbank with depths of less than 1 fathom. This shoal extending southward for about 1 1/2 miles is overgrown with vegetation during the summer and looks like an island. Morskoy Kanal is about 600 to 1,000 feet wide and 19 1/2 to 19 1/2 feet deep.

Oil tankers with a maximum draft of 19 feet have entered the harbor and berthed alongside oil piers at the northern side of Morskoy Kanal. It has been reported that ships with a draft of 30-feet can berth at wharves between the oil piers and harbor basins.

Dangers include a rectangular dumping ground, marked by buoys, with its center 1 1/2 miles north-northwestward of the northern breakwater head. Rocks, sandbanks and shoals lie adjacent to Morskoy Kanal, which undergoes constant silting. Shoals of less than 3 fathoms extend close to the western side of the channel opposite Klaipeda Basins. Numerous charted wrecks lie close northward and southward of the approach fairway. A foul area about 4 fathoms deep lies close northward of the southern breakwater head.

A prohibited anchorage area, 3 miles wide, extends northward for 5 miles from 1 mile westward of No. 1 Fairway Buoy. A prohibited anchorage area about 1 mile long is charted across Morskoy Kanal, opposite the harbor basins. Submarine cables are laid across the area and at other parts of the harbor.

CAUTION.—Westerly gales cause "rips" at the Kanal entrance which adversely impairs the steering of a ship. It is not advisable to enter the harbor. Southwesterly and northwesterly storms cause dangerous surging alongside berths. Ships should get underway and proceed to an anchorage.

ASPECT—LAND MARKS.—The terrain around Klaipeda is mostly low, sandy, and wooded. Forests on Kurskaya Kosa (sec. 9A-6), in an area about 12 miles southward of Klaipeda, are prominent. Church towers in the city, and a chimney at the cellulose works close southward, are conspicuous. Nearing port, light structures of ranges, radio masts, oil tanks, watch towers and a standpipe can be seen.

9A-8 HARBOR.—The harbor of Klaipeda, at the eastern side of Morskoy Kanal near its seaward entrance (sec. 9A-7), consists of the channel, its fronting facilities, and the outer end of the Dange River which bisects the city. The port, extending about 4 1/2 miles southeastward of the breakwater entrance, includes oil piers, commercial harbor, winter harbor, repair and boat basins, and a fishing harbor. Three bridges spanning the river include a railroad bridge about 1 1/2 miles above the entrance. The outer bridge has a vertical clearance of 15 feet, the middle bridge has a draw span. The river channel is about 16 feet deep. A ferry plies across the Morskoy Kanal between the river entrance and a landing on the opposite shore.

The harbor is 18 to 30 feet deep. Three oil piers lie adjacent to the root of the northern breakwater. The Commercial Harbor, extending along Morskoy Kanal for about 1 mile southeastward of the piers, has several berths at quays with about 30 feet alongside where general and bulk cargoes are transferred. The Winter and New Harbor basins, adjoining the Commercial Harbor for

over 1/4 mile, are lined with quays and fronted by a breakwater with an elbow quay close southward. Entrances on either end of the breakwater lead to the basins. The harbor, about 21 feet deep, is used for general cargo transfer.

The Old Repair Basin lies between New Harbor and the Dange river entrance. It is fronted by a breakwater in disrepair, with entrances on either side leading to repair quays of a shipyard. The deeper southern entrance leads to a harbor about 13 feet deep. The Dange, navigable to a bridge 1/4 mile upriver, has quays on both sides used for general cargo and lumber transfer. Cables are laid across the river. New Repair Basins extend along Morskoy Kanal southward of the river entrance. The basins are quayed and used for shipyard repairs. Extensive repair quays parallel the channel on each side of the basins. Berths have 19 to 23 feet alongside.

Fishing Harbor extends along the eastern side of Morskoy Kanal from 1 mile to 3 miles southward of the river entrance. There are three separate quays for the unloading of fish. Between the fishing harbor and shipyard basins are quays for the cellulose plant, and piers for oil bunkering and general cargo. Vessels with a draft of 19 1/2 feet can transit Morskoy Kanal to the fishing harbor. The channel from 3/4 mile southward of the river entrance is marked by buoys. The eastern side of the fairway about 2 miles from the river and the western side of Sekuma Kiaules Nugara (sec. 9A-7) are buoyed. A floating drydock, secured to buoys, is moored about 1/2 mile southward of the river mouth.

SIGNALS.—Signal stations are located at the entrance range light to Klaipeda and at the entrance to New Harbor, the southern part of Winter Harbor. International Code signals are used. Storm signals (International) are hoisted at both signal stations and by day from a mast at the entrance of the Fishing Harbor. Traffic signals are hoisted at both signal stations. By day and at night, three black balls or three red lights, vertical, denote entry, departure, or movement of shipping in port, is prohibited. Ships should anchor at the side of the channel.

REGULATIONS.—A copy of harbor regulations in force are obtained at the Port Office. E.T.A. must be given to the harbor-master 48 and 24 hours prior to arrival at No. 1 Fairway Buoy (sec. 9A-4). The precise arrival time and a request for a pilot are submitted 4 hours before arrival. Prior notice of tug assistance for entering port is required. The pilot determines the number of tugs necessary.

AIDS TO NAVIGATION.—Lights in Range, 092 1/2°, are shown from towers about 300 yards apart standing at the northeastern entrance of the harbor. A radio-beacon transmits from the rear tower. The lights will be shown during poor visibility. A light is shown from the head of the northern and southern breakwaters. A fog signal is sounded at the former.

Lights in Range, 116°, are shown from towers about 1/4 mile apart standing 3/4 mile southeastward of the rear tower of the entrance range. Lights in Range, 331°, astern, are shown from towers about 300 yards apart. The rear light is shown from the same tower as the entrance range rear light. By day, daymarks on the towers bear 330°.

Lights are shown at the entrances of Winter Harbor, New Harbor, and at the northern side of the Dange River entrance. Lights in Range, 165 1/2°, are shown from towers about 1/4 mile apart standing on Kurskaya Kosa, almost 1 mile southward of the river entrance.

Lights in Range, 155°, are shown from towers 1/4 mile apart standing about 2 1/4 miles south-southeastward of the river entrance.

Beacons, used by pilots, stand near the seashore near the entrance to port.

9A-9 PILOTS.—Pilotage is compulsory. Pilots can be obtained by day or at night from the pilot vessel in the vicinity of No. 1 Fairway lighted whistle buoy. The pilot station and lookout is located at the northern entrance of Winter Harbor. International pilot signals are used.

In stormy weather inbound ships remain at sea or anchor in the roadstead. If rough seas prevent boarding of a pilot, the inbound ship shall follow astern of the pilot vessel.

This procedure is indicated by hauling down the pilot flag and hoisting "P" flag. The following ship must comply with speed and steering signals given by the pilot vessel. When safe conditions prevail the flag procedure is reversed and pilot is boarded. Pilotage is not conducted in foggy weather. See Regulations.

ANCHORAGE.—Anchorage can be taken about 2 miles west-northwestward of the harbor entrance in 10 1/2 to 12 1/2 fathoms, sand and clay, good holding ground. The entrance rear range light bears about 108°. The anchorage is not safe in fresh westerly winds which raise a heavy sea and swell. Cargo is never worked in the roads. Vessels with dangerous cargoes anchor in the roads or off the oil piers as designated by the authorities, who also arrange for anchor berths within the harbor. The pilot flag by day and a light at night indicate the berths.

DIRECTIONS.—NEMEDRI, if applicable, supersedes any directions or navigational instructions (sec. 9A-4).

Steer a course of 092 1/2° on the Entrance Range, when seen, passing close aboard No. 1 Fairway Buoy (sec. 9A-4), allowing for current set across the entrance. When abeam the head of the southern breakwater change course to 116° on the entrance range and continue on this course until the lights in range 331°, astern, (sec. 9A-8) are aligned. Thence steer a midchannel course of 150° until abeam of the Dange River, when range lights, 155°, lead to the Fishing Harbor.

9A-10 KLAIPEDA, a first port of entry and city of about 105,000 inhabitants, is located on both sides of the Dange River near its outlet into Kurskiy Zaliv (sec. 9A-11). The port is a major Baltic oil shipping terminal with important shipbuilding and fishing industries.

BERTHS.—The three Oil Piers, 450, 800, and 820 feet long with 30 feet alongside, accommodate ships with a draft of 29 feet. The two Ballast Quays, adjacent to the Oil Piers, are 1,000 and 3,000 feet long with 30 feet alongside. Numerous 5-to 10-ton cranes serve the quays. The Commercial Quays are 650 to 1,650 feet long with 30 feet alongside with several cranes of 3-to 7-tons capacity. The Winter Harbor has berths 700

and 900 feet long, an eastern face 1,700 feet long, all with about 21 feet alongside. There are several 3-to 10-ton cranes in the harbor. Quays lining the river Dange up to the first bridge have 13 feet alongside. The Fishing Harbor has several berths up to 1,500 feet long with 15 to 23 feet alongside.

The principal quays and berths have railroad connections. Numerous tugs and lighters are available.

SUPPLIES.—Ample provisions and stores are procurable. Water is piped to the principal berths. There are water boats. Fuel oil and diesel oil is available at the oil piers.

REPAIRS.—General hull and machinery repairs can be made. There are marine railroads and building ways for cargo ships and fishing vessels. Floating drydocks with a lifting capacity of 300 tons are available, as are floating cranes of 50 and 100 tons. One floating drydock has a lifting capacity of about 2,000 tons.

COMMUNICATIONS.—Klaipeda is connected by rail with the national system of railroads. Shipping is conducted with North and Baltic seaports, also with inland waterways harbors during the summer.

DERATTING.—See section 1-11.

MEDICAL.—There are hospitals in the city. Quarantine and disinfecting stations are located near the root of the southern breakwater.

KURSKIY ZALIV

9A-11 Kurskiy Zaliv, also known as Kurisches Haff, is a gulf or inland sea extending about 50 miles southward of the entrance to Klaipeda Harbor. It is separated from the Baltic by Kurskaya Kosa (sec. 9A-6), irregularly indented along its eastern side. The eastern or mainland side of the gulf is low and mostly wooded. The several small harbors within Kurskiy Zaliv require local knowledge.

NAVIGATION.—See section 9A-4, 9A-9.

WINDS-WEATHER.—See section 9A-7. In the gulf the water level usually rises about 1 foot with northerly winds and falls about 8 inches below the mean level with southerly winds. A water gage at Juodkrante (55°33', 21°08'E.), when the gulf was ice-free, has indicated a rise of 3 3/4 feet and a fall of 2 1/2 feet, but these variations are rare.

CURRENT.—The current usually flows northward to Klaipeda.

ICE.—The gulf is ice-bound during the winter season.

DEPTHS—DANGERS.—General depths of 1 1/2 fathom to 1 1/2 fathoms exist in the northern part and 2 to 2 fathoms in the southern part of the gulf. A channel, marked by buoys, leads through the northern part of Kurskiy Zaliv passing close westward of Sekluma Kiaules Nugara (sec. 9A-7) and close to the eastern side of Kurskaya Kosa (sec. 9A-6). Vessels with a draft of 13 feet can proceed from Klaipeda to Lesnoy Harbor (55°01'N., 20°37'E.), located about 46 miles south-southwestward of Klaipeda. There are depths of 1 1/4 fathoms in the channel from Klaipeda to the river Atmata (55°20'N., 21°17'E.), and 1 1/4 fathoms to rivers at the southern end of the gulf, subject to silting. Branches of the several rivers emptying into the gulf join an inland waterways system. A canal for shipping timber leads from about 2 3/4 miles southward of the Dange river outlet to the Atmata in a depth of 1 1/4 fathoms. Kaliningrad (sec. 8C-10) can be reached through this canal and its various river connections. Sovietsk, about 32 miles from the mouth of the Atmata, and Kaunas, about 115 miles east-southeastward of Klaipeda, are river ports on the inland waterways. There is a general depth of 1 1/4 fathoms in the canals.

Numerous 1-fathom shoals extend about 1 1/2 miles off the eastern shore of the gulf. Rocky shoals of less than 2 fathoms extend off the southern shore. There are several detached rocky patches of 1 fathom scattered throughout the gulf. A bight extending almost 10 miles southward of the Atmata is overgrown with reeds. Buoys mark all dangers.

HARBORS.—See section 9A-6. Juodkrante, on the eastern side of Kurskaya Kosa, about 10 miles southward of Klaipeda, is a summer resort with a landing having 9 feet alongside. Range beacons lead to the landing. Nida, a summer resort about 14 miles southward of Juodkrante, is formed by two moles. A quay in the harbor has 6 1/2 feet alongside. Rybachiy (55°09'N., 20°51'E.), a fishing harbor and resort, is formed by a breakwater about 1,150 feet long with landing facilities in 8 feet at its head.

The southern and eastern sides of Kurskiy Zaliv have several, small fishing harbors usually near the mouths of the various rivers and their branches. Buoys and ranges mark the channels leading to the harbors. Some of the ranges are lighted. Storm signals are hoisted at many of the harbors.

AIDS TO NAVIGATION.—Lights are shown on salient points about 8 and 13 miles southward and south-southeastward, respectively, of Juodkrante. A light, visible in the gulf only, is shown on a point close eastward of the church in Rybachiy.

PILOTS.—Pilots are not available for Kurskiy Zaliv.

DIRECTIONS.—Local knowledge is necessary.

ANCHORAGES

9A-12 KLAIPEDA.—See section 9A-9.

PART B. KLAIPEDA TO AKMENRAGS

9B-1 Klaipeda is described in sections 9A-7 through 9A-10.

COAST—GENERAL

9B-2 The coast extending for about 66 miles northward from Klaipeda to Akmenrag is regular in outline and has no salient features. The wooded coast northward of Klaipeda decreases in height, becomes bare, with sand dunes backing sandy beaches. The few coastal lights are charted. There are no natural landmarks.

DEPTHS—DANGERS

9B-3 See section 9-1. Depths gradually decrease approaching the coast. The 10-fathom curve lies about 2 to 7 miles off shore. There are no off-lying dangers except for several sunken wrecks, best seen on the chart. Dangers in the approaches to Liepaja are described with that port. Other dangers, including the prohibited areas off this coast, are described with related features.

NAVIGATION

9B-4 See section 8B-4. From a position about 5 miles westward of the entrance to Klaipeda (sec. 9A-4), a course of 350° for 45 miles leads to the approach buoy moored off Liepaja. Thence a course of 021° for

25 miles leads to a position about 4 1/2 miles off Akmenrags (sec.9B-12). The least depth on the track is 9 fathoms.

CURRENTS

9B-5 See section 9-4. The predominant northerly or southerly coastal current may attain a velocity of 2 knots with strong winds.

ICE

9B-6 See section 9-5

COASTAL FEATURES—LANDMARKS

9B-7 The hilly, wooded coast between Klaipeda and Palanga Harbor (55°55'N., 21°04'E.), about 11 miles northward, is fronted by shoals of less than 5 fathoms lying up to 2 1/2 miles offshore. An obstruction with 2 1/2 fathoms over it lies 1 3/4 miles southward of the harbor. The village church spire and a hill about 1 mile southward are conspicuous. The harbor can be entered from the northward by vessels with a draft of 5 feet.

Between Palanga and Liepaja, about 36 miles northward, the sandy coastal dunes are backed in places by cultivated land reaching inland to the woods. Lights are shown on the coast at Svetoji and Pape, villages about 6 and 14 miles northward of Palanga, respectively. Svetoji fishing harbor, formed by moles, is entered by vessels with a draft of 5 feet. There are berths with 5 feet alongside. Pape fishing harbor, formed by moles, has 8 feet in the entrance leading to a shallow inner harbor. Lights are shown from a molehead at each of these harbors. Storm signals are shown at Pape Lighthouse.

Gora Tyupa, an eminence about 110 feet high, is a prominent landmark standing 7 1/2 miles northward of Pape. A prohibited area, closed to shipping, extends 3 1/2 miles offshore between Gora Tyupa and a position about 3 miles northward of Pape. A dangerous wreck, marked close westward by a buoy, lies at the southeastern side of the area in which there are depths of less than 4 fathoms.

A light is shown at Bernati (56°23'N., 20°59'E.), a village 6 1/2 miles northward of Gora Tyupa. A reef, with depths of less than 3 fathoms, extends about 2 1/2 miles offshore in the vicinity of Bernati. Depths of less than 6 fathoms exist up to 2 1/2

miles off the coast between Bernati and Liepaja. Ships proceeding coastwise between Klaipeda and Liepaja should keep at least 4 miles offshore to clear the shoals.

LIEPAJA (56°31'N., 21°01'E.)

9B-8 Liepaja, formerly known as Libau, is a commercial and naval port located on a low, narrow coastal spit adjacent to the northern end of a lake separated from the Baltic by the land spit.

The port of Liepaja is closed to foreign shipping (1967). Much of the commercial activity is in support of military organizations.

NAVIGATION.—See Chapter 1 and section 9B-4. Local Magnetic Disturbances exist in the approaches to port. The latest NEMEDRI should be followed, if applicable.

WINDS—WEATHER.—See section 9-3.

ICE.—See section 9-5. Ice does not impede navigation during a normal winter season. If necessary, icebreakers keep the harbor open to shipping. Ice may be present between January and March.

CURRENTS—WATER LEVEL.—See section 9-4. Tidal rise is negligible. The current, running parallel to the coast, may attain a velocity of 2 knots with fresh winds. The water level may rise 3 feet above or fall 2 feet below the mean sea level.

DEPTHS—DANGERS.—The main approach channel to Liepaja, marked by buoys, leads east-northeastward to Vidus varti, the middle and principal entrance to the port. This dredged channel across the bank is subject to silting as are harbor channels and their entrances. Dredging is performed periodically. There are northerly and southerly secondary approaches to port. All approaches lead to entrances between breakwaters which form the Outer and Commercial Harbors.

The main approach channel has a controlling depth of about 30 feet. Vidus varti, lying between Northwest and Southwest Breakwaters, has a fairway 700 feet wide with a controlling depth of 31 feet. The northern and southern secondary channels have least charted depths of 24 and 20 feet, respectively. The former leads between North and Northwest Breakwaters; the latter between Southwest and South Breakwaters.

The Naval Harbor, entered from the eastern side of Outer Harbor, has a controlling depth of 29 feet in the channel with a controlling width of 200 feet at the draw-bridge. The channel leading through Outer Harbor to Commercial Harbor has a controlling depth of 23 feet, with 30 feet in the turning basin.

DANGERS.—A 3-to 6-fathom bank extends almost 4 miles westward of Liepaja and the coast northward and southward of port. Numerous wrecks, best seen on the chart, lie sunk on the bank, close inshore and near the approaches. A 2 3/4-fathom shoal lies about 2 miles northwestward of Vidus varti. Several 3 1/4-fathom patches lie within 1/2 mile northeastward and southeastward of the shoal. An obstruction with 2 1/2 fathoms over it, marked by a buoy, lies about 2 1/2 miles west-northwestward of Vidus varti. Another obstruction, marked by a buoy, lies close northward of the northern entrance to port.

A spoil ground, marked by buoys at each corner, lies 3 to 4 miles northward of North Breakwater. Anchoring and fishing are prohibited in an area extending about 8 miles northwestward and southwestward of Liepaja. A submarine cable is laid from a position about 3/4 mile southward of Liepaja Lighthouse north-northwestward through the outer extremity of the prohibited anchorage, about 8 1/2 miles distant.

Prohibited anchorages extend about 1/2 mile seaward of the main and southern entrances to port.

ASPECT—LANDMARKS.—Various large buildings, high chimneys and church spires, are conspicuous from the offing in this low, coastal area. A cathedral northeastward of port, the main lighthouse, a standpipe, and pilot tower are especially prominent.

9B-9 HARBOR.—The harbor consists of three parts, an Outer Harbor, Commercial Harbor and Naval Harbor. The Outer Harbor is enclosed by breakwaters through which three openings lead to port. About 2 miles long, with depths of 5 to 32 feet, the Outer Harbor comprises the western part of the port. Shoals extending off the inner sides of the breakwaters and eastern part of the harbor, lie close to channels leading to the Commercial and Naval Harbors.

Commercial Harbor, comprises a canal that bisects the city and connects Outer Harbor with Liepajas Ezers, a shallow lake at the eastern end of the canal. The harbor consists of New Harbor, Winter Harbor, and Fishing Harbor. The former, at the southeastern end of Outer Harbor, is formed by detached breakwaters and a wide quay on the southern side on which are grain elevators and warehouses. There are depths of 7 to 24 feet in New Harbor. Strong westerly and northerly winds interrupt cargo handling at quay berths.

Commercial Harbor Canal, with a channel about 330 feet wide, is entered between the wide quay previously mentioned and the inner part of South Breakwater (sec. 9B-8). There are depths of 18 to 24 feet between the entrance and a highway bridge about 1 1/4 miles southeastward and 10 to 13 feet up to a railroad bridge 1/4 mile further eastward. The bridge spans have a vertical clearance of 10 feet. Quays lining both sides of the canal handle bulk and general cargoes. Coastwise vessels berth eastward of the highway bridge.

Winter Harbor, a basin leading off the northern side of Commercial Harbor Canal and close southeastward of the wide quay forming New Harbor, has depths of 18 to 24 feet with 13 to 18 feet along the northwestern side. Quays line the sides of the basin devoted to the oil and timber trade. Fishing Harbor, a quayed basin with a depth less than 18 feet, lies on the southern side of the canal opposite the southeastern entrance to Winter Harbor. The customhouse and Pilot Tower stand close southeastward of Fishing Harbor. A turning area at the entrance of Winter Harbor has a controlling depth of 22 feet.

SIGNALS.—There is a signal station at the Pilot Tower. Communication is effected via the International Code of Signals. Storm signals are shown at Liepaja Lighthouse.

REGULATIONS.—Tugs are ordered to assist ships in the harbor. All ships must proceed to Customs Quay for clearance unless directed otherwise. A copy of the Harbor Regulations can be obtained at the Harbor Office.

AIDS TO NAVIGATION.—Fairway Lighted Buoys No. 1 and No. 2, the former with a whistle and radar reflector, are moored about 10 1/2 and 5 miles west-southwest-

ward of the main entrance to port, respectively.

Lights in Range, 068°, shown from beacons with triangular daymarks standing about 1/2 mile apart at the southern entrance and northern side of the Naval Harbor, lead through the buoyed main approach channel. Lights are shown from the northern and southern side of the main entrance. A fog signal is sounded at the northern end of South Breakwater. Lights are shown from the outer ends of the detached breakwaters forming Winter Harbor. Liepaja Light (56° 31'N., 21°00'E.), is shown close southward of the Winter Harbor and about 1 mile southeastward of the southern entrance. A radio-beacon transmits at the light tower.

Lights in Range, 171°, shown from posts with triangular daymarks standing on and near the breakwater at the entrance of the Commercial Harbor Canal, lead through the approach fairway to Commercial Harbor. Lights in Range, 154°, shown from masts with daymarks standing close together about 1/3 mile northwestward of Liepaja Light, lead to the entrance of Commercial Harbor Canal. Lights are shown from the ends of the wide quay on the northern side of Commercial Harbor Canal entrance and from the entrance of Fishing Harbor.

9B-10 PILOTS.—Pilotage is compulsory. Pilots can be obtained in the vicinity of No. 2 Buoy (sec.7B-9). A lookout is maintained at the tower of the Pilot Station, located near Fishing Harbor. Pilots are available on prior notice at any time.

ANCHORAGE.—If necessary, insecure anchorage can be taken in the open roadstead seaward of port and clear of the prohibited area (sec.9B-8). Fairly tenable anchorage can be taken in 9 to 10 fathoms, sand, about 4 miles southwestward of Liepaja Lighthouse.

Tenable anchorage can be taken in 3 1/2 to 5 1/2 fathoms, clay, in the Outer Harbor, safe from all strong winds. An ample scope of chain should be ranged out. Mooring buoys are available if needed.

DIRECTIONS.—In thick weather, ships should not approach port in less than 10 fathoms unless the ship's position is known. From No. 1 Lighted Whistle Buoy (sec.7B-9), steer 068° on the approach range, passing

close aboard No. 2 Fairway Buoy and through the buoyed channel leading to the main entrance into the Outer Harbor. The range alignment must be closely observed and speed maintained to avoid being set by the cross-current in the channel (sec.9B-8). After clearing the main entrance steer 171° on the middle range for the Commercial Harbor. When the inner range is aligned 154°, change course on this alignment and steer for the Commercial Harbor Canal entrance.

9B-11 LIEPAJA, a city of about 82,000 inhabitants, is an important naval base with numerous military installations. Commercial activity is varied. There are naval ship-repair yards and processing plants for sugar, oils and fish. Grain, timber, and livestock are exported.

BERTHS.—Piers in North Basin, suitable for general cargo, are about 350 feet long with 17 to 31 feet alongside. The eastern side of North Basin has berths at a quay about 2,400 feet long with 13 to 15 feet alongside. Cranes at the berths have maximum lifts of 15 tons. Docking Basin has two ship-repair quays having berths extending 1,550 feet with 13 to 20 feet alongside. Oil bunkers are available at a wharf 310 feet long with 29 feet alongside located on the southern side of the basin.

Free-Port Quay, at the southwestern side of New Harbor, is a general cargo quay about 1,700 feet long with 19-feet alongside. There are cranes with capacities of 3 tons or more and bonded warehouses.

The quay forming the western side of Winter Harbor is about 2,500 feet long with 13 to 16 feet alongside. General cargo is handled. There are cranes of 3-to 25-tons capacity. The eastern side of the basin has a quay about 2,000 feet long with 22 feet alongside. Coal and general cargoes are handled. Oil tankers discharge alongside. Several cranes of 3 and 6 tons are available, also a crane of 25 tons.

The Commercial Harbor Canal has about 4,600 feet of berthing quays on the northern side with 20 to 22 feet alongside. General cargo and bulk grain are handled. Several cranes of 3 and 8 tons are available. The southern side of the canal has about 4,800 feet of berthing quays with 11 to 18 feet alongside. General cargo and oil bunkers are

transferred. There are several cranes of 2- and 3-tons capacity.

The principal berths in port are served by the railroad. Tugs are available. There are floating cranes, the largest 150 tons and others of 50 and 25 tons.

SUPPLIES.—Ample stores and provisions can be procured. Fuel oil and diesel oil are obtainable at bunkering quays and from an oil barge. Fresh water is piped to some berths. Water boats are available.

REPAIRS.—There is a naval shipyard at North and Docking Basins where major repairs can be made. The yard has 2 drydocks about 750 feet long, 95 feet wide, with 34 feet over the sill. There are 3 floating cranes with capacities up to 50 tons, numerous cranes of 10 to 15 tons, and 2 small floating drydocks.

COMMUNICATIONS.—The port is connected by railroad with interior urban areas and coastal harbors. Regular shipping services are conducted with the major ports of the Baltic and North seas.

DERATTING.—See section 1-11.

MEDICAL.—There is a public hospital available. Quarantine regulations are enforced.

COASTAL FEATURES—LANDMARKS (Continued)

9B-12 The coast from Liepaja extends, without interruption, northward for about 19 miles to Akmenrags. The intervening coast is sandy, backed by sand dunes, with woods standing further inland. The land is cultivated extensively between the dunes and woods. Akmenrags Lighthouse and Ziemupe Church (56°45'N., 21°05'E.), are conspicuous landmarks.

DANGERS.—The 10 fathom curve lies about 4 miles offshore except in the vicinity of Akmenrags where it closes the coast about 2 miles. There are depths of less than 6 fathoms up to 2 1/2 miles offshore. A 2 1/2-fathom patch lies about 1 mile off the coast 8 miles northward of Liepaja Lighthouse. A 3 3/4-fathom patch lies about 3 1/4 miles south-southwestward of Akmenrags. Foul ground extends 2 1/2 miles northward and southwestward of Akmenrags. A rock, with less than 1 fathom over it, lies about 1 1/4 miles north-northwestward of Akmenrags.

A Mine Exercise area, about 3 miles in extent, has its center 20 miles westward of Akmenrags.

MEASURED DISTANCES.—A measured distance of 5 miles, marked by 3 pairs of beacons ashore, has its northern limit 5 miles westward of Ziemupe. Buoys aligned with the beacons mark the seaward limits of 1- and 2-mile runs within the area.

AKMENRAGS (56°50'N., 21°03'E.), a blunt point on the coast, is marked by a prominent tower. A light is shown and a fog signal is sounded at the tower.

ANCHORAGES

9B-13 **LIEPAJA.**—See section 9B-10.

PART C. AKMENRAGS TO OVISI

9C-1 Akmenrags is described in section 9B-12.

COAST—GENERAL

9C-2 The coast at Akmenrags curves northeastward for about 18 miles forming a broad bight with a regular coastline, thence continues northward and north-northeastward to Ovisi. Several small rivers empty into the sea along this stretch of coast. Lights and landmarks are few. From the offing the coast appears darkly wooded due to forests backing the low coast. Ventspils is the only important harbor.

DEPTHS—DANGERS

9C-3 There are no off-lying dangers along this coast. Depths gradually decrease approaching shore except where detached sandbanks exist. There are numerous unmarked wrecks near the 10-fathom curve which parallels the coast about 5 miles offshore. Patches of 7 3/4 and 9 3/4 fathoms lie about 19 miles and 28 miles northward of Akmenrags, respectively. Dangers inside the 5-fathom curve are described with related features.

NAVIGATION

9C-4 See section 9B-4. From a position about 4 1/2 miles off Akmenrags (sec. 9B-12), a course of 021° for 49 miles leads in a least

depth of 10 1/2 fathoms to a position 8 1/4 miles off Ovisi (sec. 10A-1).

CURRENTS—WATER LEVEL

9C-5 See section 9-4.

WINDS—WEATHER

9C-6 The prevailing winds are southwesterly. Southeasterly and southerly winds are frequent in the autumn, northerly and westerly winds during the summer months. Southwesterly and westerly storms occur in the winter and autumn. Fog occurs most frequently when mild southeasterly and southwesterly winds blow, also during calm weather.

ICE

9C-7 Ice forms along the coast in February but does not extend seaward except during severe winters.

COASTAL FEATURES—LANDMARKS

9C-8 BETWEEN AKMENRAGS AND VENTSPILS, about 39 miles north-northeastward, the coast is formed by a chain of high, partly wooded sand dunes. Noticeable because of their light color against a wooded background, the dunes decrease in height northward. The coast about 12 miles south-southwestward of Ventspils appears prominently as three sharply-defined hills with thickets. The 5-fathom curve lies 1 to 2 miles off this coast.

Pavilosta (56°54'N., 21°10'E.), a harbor about 5 miles from Akmenrags, is formed by the mouth of Saka River and two breakwaters extending seaward. The dredged harbor entrance, about 130 feet wide, has depths of 8 to 10 feet, subject to silting. Inside the entrance there is a depth of about 12 feet. Wrecks lie near a 2 1/2-fathom patch about 1 mile westward and 4 1/2 miles north-westward of the entrance. The high smoke-stack of a distillery is conspicuous about 1 3/4 miles southeastward of the harbor.

Uzava, a prominent sandy height, partly wooded, rises on the coast about 21 miles north-northeastward of Pavilosta. Uzava appears as three hills from offshore. A light is shown from a tower with a radar reflector at Uzava. Storm signals are shown.

A coastal shoal of 4 3/4 fathoms extends about 2 miles off Uzava. Wrecks lie 4 and 10 miles westward of the light. Rocky foul ground extending about 2 miles offshore lies 3 to 7 miles northward of Uzava. A 2 1/4-fathom patch, marked by a buoy, lies at the north-northwestern edge of the foul area. Wrecks lie about 2 miles seaward of the buoy. Vessels should keep at least 4 miles off this coast.

Several beacons stand on the coast between Uzava and Ventspils. The most prominent is located about 5 1/2 miles northward of Uzava.

VENTSPILS (57°24'N., 21°32'E.)

9C-9 Ventspils, also known as Windau, is a commercial port located at the mouth of the Venta River, about 12 miles north-northeastward of Uzava (sec. 9C-8). The port is open to all foreign commercial ships and is important as an oil shipping terminal.

NAVIGATION.—See section 9C-4. From a position on the coastal track about 8 miles northwestward of Ventspils, steer 144° on the approach range for 1 1/2 miles to No. 1 Lighted Fairway Buoy.

WINDS—WEATHER.—See section 9C-6. The water level rises to 1 1/2 feet with strong northwesterly and southwesterly winds. Northerly and southeasterly winds lower the level a like amount. During ice breakup in the Baltic the water level in the harbor may rise 4 to 6 feet above sea level.

ICE.—Ice may be present between December and April, however, the port is never closed by ice. During January and February ice may hinder shipping, also when northwesterly winds carry ice into the outer harbor, but icebreakers relieve the congestion. Easterly winds and an out-going current clear ice from the river and inner harbor.

TIDES—CURRENTS.—Tides are negligible. The current always sets northward or southward along the coast in the approaches to Ventspils and may reach a velocity of 2 knots. Current in the Venta River averages 1 knot, increasing to 2 knots in the entrance. During spring ice breakup, the current reaches a velocity of 4 knots.

DEPTH—DANGERS.—The buoyed approach channel, about 360 yards wide and 31

feet deep, leads from Lighted Fairway Buoy No. 1 to the entrance between breakwaters. An approach channel leading to Oil Piers at the southeastern side of the Outer Harbor is at least 33 feet deep. A dredged entrance channel, leading from the breakwater entrance to the mouth of the Venta River, is about 110 yards wide and 31 feet deep. The river channel is, at most, 30 feet deep for 2 miles within the entrance.

Silting is prevalent in the channels and entrance to the river. Constant dredging is necessary to maintain depths.

Normally, there is a least controlling depth of 27 feet in the entrance and river channels to the drawbridge, and 20 feet above the bridge. The least controlling depth in the channel leading to the oil piers is 30 feet. Tankers with a draft of 33 feet have berthed at the oil piers. Ships with a draft of 27 and 30 feet are accommodated in the respective channels.

DANGERS.—Numerous wrecks, best seen on the chart, lie sunk in the vicinity of the approach channel. The most dangerous wreck is marked by a lighted buoy moored close northeastward of the fairway and about 2 1/2 miles northwestward of the Approach Range Lights. Buoys mark other wrecks nearby.

The coastal shoal, with depths of less than 3 fathoms, extends about 2 miles offshore close northward of the approach channel. A buoy marks the seaward side of the shoal.

A spoil ground, marked by a lighted buoy, parallels the coast about 1 1/2 to 3 1/2 miles northward of the river entrance to port. A smaller spoil ground lies about 4 1/2 miles northward of the entrance.

A 1 3/4-fathom obstruction, marked by a buoy, lies close southwestward of the approach fairway and about 1 mile northwestward of the southern breakwater. A 2 3/4-fathom patch lies about 1/4 mile southeastward of the obstruction.

A prohibited anchorage area, lying between Ventspils and a position on the coast 5 miles southward, extends about 7 miles westward and northwestward of the port entrance.

ASPECT—LANDMARKS.—Landmarks visible against the low, darkly wooded area around Ventspils include a high church spire in the center of town close southward of the

river. The pilot tower at the river entrance is also prominent. Nearing port, the light-houses on the breakwater heads, the entrance range beacons, and a chimney at the fishing harbor are conspicuous.

9C-10 HARBOR.—The Outer Harbor is formed by two breakwaters, with an entrance between heads 350 yards wide. The harbor, 10 to 33 feet deep, has shoals extending offshore and from each breakwater which constrict the entrance channel. Oil piers extend off the southeastern side of the harbor. The entrance channel leads along the southwestern side to the river entrance. A spur and shoal along the northern side of the entrance has been removed. A Fishing Basin extending southward near the river entrance has two quays, each 450 feet long with at least 13 feet alongside.

CAUTION.—With strong westerly winds, it is dangerous for ships to remain in the Outer Harbor.

The Inner Harbor is formed by a 2 1/2-mile stretch of the Venta River, about 110 yards wide at the entrance to 250 yards wide at the outer drawbridge. The river, with steep banks, is lined with quays on both sides and is 22 to 25 feet deep outside the dredged channel. There are no quays above the outer drawbridge although vessels with a draft of 8 feet can proceed upriver for about 11 miles. Two other drawbridges cross the river above the outer bridge. General and bulk cargoes are handled at the Inner Harbor.

A repair yard for small fishing and naval craft is located adjacent to the fishing basin at the river entrance. Close within the northern entrance of the river are mooring dolphins extending upriver about 1/6 mile, with 16 1/2 to 24 1/2 feet alongside.

An old fishing basin, at least 8 feet deep, is situated on the southern side of the river about 1/4 mile inside the entrance.

Winter Harbor (57°24'N., 21°34'E.), about 13 feet deep, is fronted by a line of dolphins along the southern side of the river and is available to naval craft.

SIGNALS.—Storm signals are shown from a mast standing close eastward of the old fishing basin. A signal station, from which communication is conducted with ships via the International Code of Signals is located

at the Pilot Tower about 300 yards westward of the entrance range beacons. Ice signals and icebreaker signals for the coast northward of Ventspils, including the Gulf of Riga, are hoisted on the northern and western sides, respectively, of a building located on the northern bank of the river about 1/4 mile within the entrance. A copy of the latest signals in use are obtainable at the Harbor Office, located close eastward of the old fishing basin.

REGULATIONS.—Copies are available at the Harbor Office. E.T.A. should be transmitted to the harbor master at least 48 and 24 hours prior to arrival, with the precise arrival time given 4 hours in advance accompanied by a request for a pilot. Communications are conducted via Radio Ventspils.

AIDS TO NAVIGATION.—Fairway Lighted Whistle Buoy No. 1, with a radar reflector, is moored on the range alignment about 5 miles northwestward of the breakwater entrance. Lights are shown from towers, with radar reflectors, located at the head of each breakwater. Lighted buoys, with radar reflectors, mark the sides of the entrance channel.

Lights in range, 144°, are shown from framework structures, about 1/4 mile apart, located at the southern side of the river entrance. A Radiobeacon (57°24'N., 21°33'E.), transmits at the Pilot Tower. Lights are shown at the river entrance, from various quays, basins, and from the head of the oil piers.

9C-11 PILOTS.—Pilotage is compulsory. Pilots can be obtained by day or at night in the vicinity of No. 1 Fairway Buoy. The Pilot Station is located at the Harbor Office. See Regulations.

When stormy weather prevents a ship entering the harbor, or if a berth is not available, ships must remain at sea or roadstead. If sea conditions prevent a pilot boarding, the ship shall follow the pilot boat into the harbor.

ANCHORAGE.—Anchorage can be taken in 10 to 12 fathoms, mud or sand, about 3 to 3 1/2 miles northwestward of the breakwater entrance, clear of the prohibited anchorage area and Fairway Buoy.

DIRECTIONS.—The latest NEMEDI supersedes approach navigation (sec. 9C-4) or directions. Approaching port, allow for the current (sec. 9-4), by keeping 4 to 5 miles offshore. From Fairway Lighted Whistle Buoy No. 1, steer 144° on the entrance range alignment, passing midway between the heads of the breakwaters and into the Outer Harbor. Thence steer for the oil piers, or remain on the rangeline, passing between the lighted buoys marking the channel until reaching the river entrance. Steer a midchannel course in the river.

9C-12 VENTSPILS, a first port of entry and town of at least 35,000 inhabitants, is located on both sides of the Venta River at its outlet into the Baltic.

BERTHS.—There are two oil piers in the Outer Harbor, each 1,000 feet long with 33 feet alongside, available to tankers of 25,000 d.w.t. Berths along the northern side of the Inner Harbor include the Fishing Wharf, 1,150 feet long with 25 feet alongside. Several 1 1/2- and 2 1/2-ton cranes are available. Export Quay, adjacent to Fishing Wharf, is 2,500 feet long with 25 to 29 feet alongside. Numerous cranes of at least 5 tons capacity serve this general and bulk cargo quay. Import Quay, adjacent to Export Quay, is 1,400 feet long with 21 to 26 feet alongside. Numerous cranes of at least 5-tons capacity serve this general and refrigerated cargo quay. Coal Quay, contiguous to Import Quay, is 740 feet long with 20 feet alongside. There are 5- and 45-ton cranes. Southeast Quay, near the outer drawbridge is 1,200 feet long with 22 feet alongside. General cargo is handled and naval vessels take on bunker oils. There are two timber wharves with 16 feet alongside between the inner drawbridges.

On the southern side of the river opposite the Coal Quay, is West Wharf, about 725 feet long with 21 feet alongside. It is used by fishing vessels. A concrete plant quay, 700 feet long with 21 feet alongside, adjoins West Wharf. Naval Quay, opposite Export Quay, is 3,700 feet long with 20 to 25 feet alongside. Town Quay, for fishing vessels, is 1,000 feet long with 24 feet alongside. It is adjacent to the old fishing harbor.

The principal berths of the Inner Harbor are served by the railroad. There are several floating cranes, the largest of 100 tons capacity. Tugs are available.

SUPPLIES.—Provisions are obtainable in moderate quantity. Fuel and diesel oils are available at the oil piers. Water is piped to several berths and is available from water boats, but must be boiled for drinking purposes.

REPAIRS.—Minor repairs can be made. Divers are available. There is a 60-ton marine railway.

COMMUNICATIONS.—A passenger ferry crosses the river near Import Quay. The port is connected with the general railroad system. Ventspils has air services with other areas of the U.S.S.R. Regular shipping services are conducted with Riga and Liepaja.

DERATTING.—See section 1-11.

MEDICAL.—There is a hospital in town. Quarantine regulations are enforced.

COASTAL FEATURES—LANDMARKS (Continued)

9C-13 BETWEEN VENTSPILS AND OVISI, about 12 miles north-northeastward, the coast is low, sandy, backed by partly wooded sand dunes. A chain of sandy hills appears 2 miles northward of Ventspils. At Busnieku (57°28'N., 21°37'E.), on the coast about 5 miles from town, a white sand dune backed by woods is a conspicuous landmark. A light is shown at Busnieku. The railroad runs parallel to the coast and close inshore between Ventspils and Ovisi.

The coastal shoal, with depths of 1 1/2 to 5 fathoms, extends up to 4 miles off this coast. Ovisi, and its attendant dangers, are described in Chapter 10.

ANCHORAGES

9C-14 VENTSPILS.—See section 9C-11.

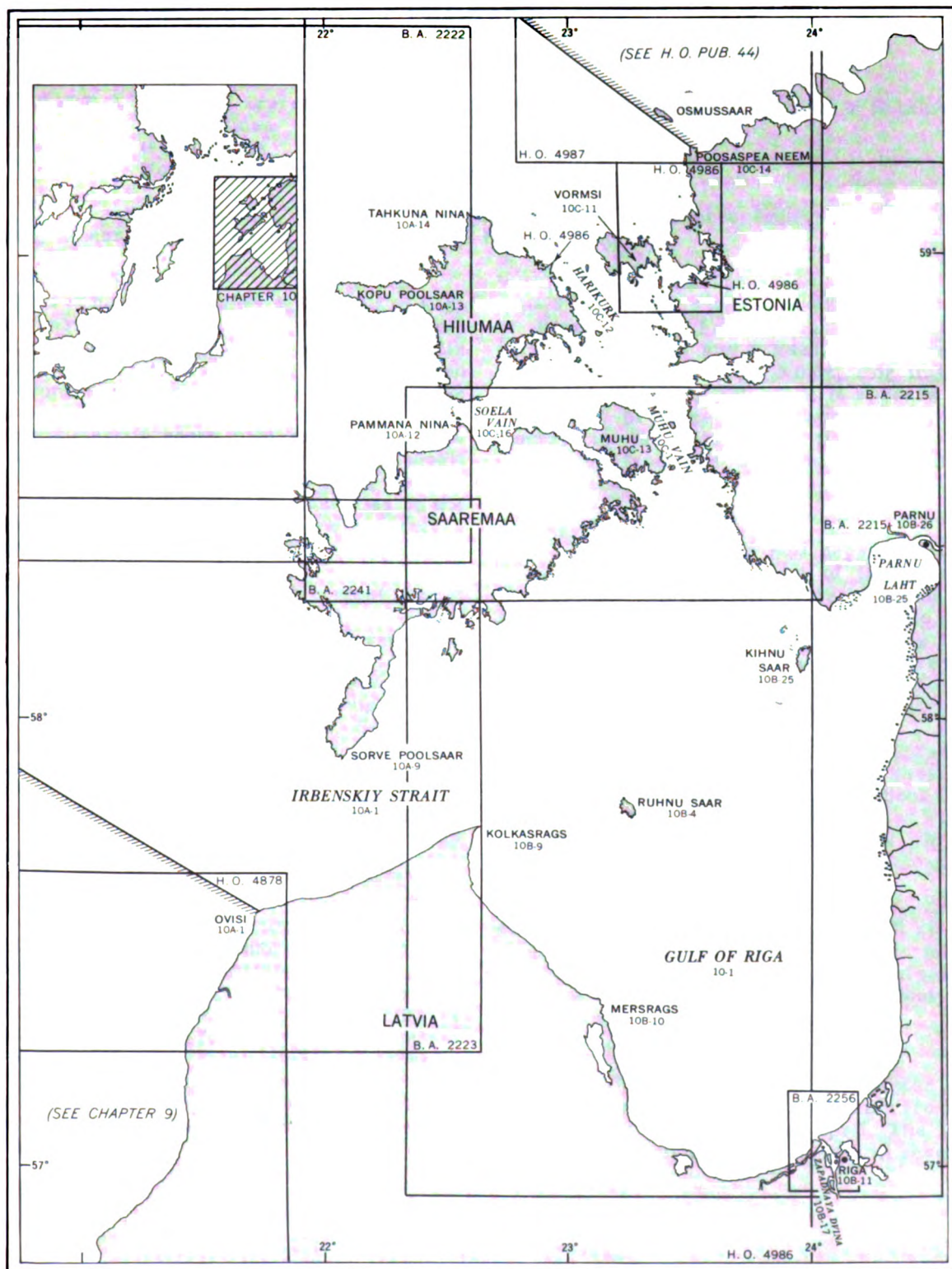


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 10—GRAPHIC INDEX

CHAPTER 10

GULF OF RIGA AND APPROACHES

PART A. Western approaches to the Gulf of Riga and the western coasts of Saaremaa and Hiiumaa.

PART B. Gulf of Riga

PART C. Northern approach to the Gulf of Riga.

Plan.—This chapter describes the Gulf of Riga, its shores, approaches, and off-lying dangers. The sequence of description is from west to east.

GENERAL REMARKS

10-1 The Latvian side of the Gulf of Riga is generally sandy and low, with occasional cliffs. Low ridges of wooded sandy hills back the coast. Large boulders are often encountered near the shore. The Estonian side of the gulf is very irregular, low, with numerous rocky peninsulas and bights backed by woods. There are many small villages and summer resorts along the gulf coast. Ruhnu, an isolated island lies in the central part of the gulf. There are only a few prominent landmarks, but the gulf has numerous aids to navigation.

Depths in the western and central part of the gulf average 15 to 22 fathoms, sand and mud. Numerous rocky shoals extending off the northwestern and northeastern sides of the gulf lie within the 10-fathom curve. The Gulf of Riga is entered through Irbenskiy Strait, northward of Ovisi. Secondary channels lead from the northern part of the gulf to the Gulf of Finland.

The few tenable anchorages, also prohibited areas are described with related features. Principal ports in the gulf are Riga and Parnu.

NAVIGATION

10-2 NEMEDRI, if applicable, should be followed. The navigational track along this coast is described in Chapter 1. An alternate track leads, from a position about 7 miles southeastward of the southern extremity of Gotland (sec. 4-2), for 126 miles, on course 060°, over a least depth of 7 1/2 fathoms, to Irbenskiy Lightship (sec. 10A-1). The coastal track from Liepaja (sec. 9B-4), continues on course 021° over a least depth of 6 fathoms to the lightship.

WINDS—WEATHER

10-3 Westerly winds prevail in the Gulf of Riga. In the autumn fresh westerlies raise heavy seas and a swell which drops rapidly with decreasing winds. Fog in the gulf is infrequent, but when it appears is dense and prolonged. It occurs most frequently in the autumn. At times, a land fog rising from the sand dunes may hide coastal landmarks.

CURRENTS—WATER LEVEL

10-4 Currents in the gulf depend on the strength and direction of the winds. With southwesterly and westerly winds a strong current from the Baltic sets into the gulf through Irbenskiy Strait, reaching the eastern shores of the gulf where it is diverted northwestward past the island of Kihnu 58°06'N., 23°59'E. to the secondary channels (sec. 10-1). Current velocity is 1 to 1 1/2 knots. During calm weather, the current sets northward or southward along the eastern shore of the gulf with a velocity of about 1/2 knot. A current flows from the Gulf of Finland through the secondary channels with a velocity of 1/2 to 3/4 knot during prolonged fair weather.

The water level varies with direction, strength, and duration of the wind. It rises with southerly and southwesterly winds; falls with northeasterly winds. In spring and summer the level seldom exceeds 1 1/2 feet; in autumn and winter, 3 to 4 feet.

ICE

10-5 See section 9C-7 and Chapter 1. The shore waters of the gulf remain frozen between late December and April. The ice area expands during February and in severe

winters the entire gulf and Irbenskiy Strait is ice-bound. In normal winters drift ice is set southward from the northern part of the gulf by northerly and northeasterly winds. Ice forms quickly in the southern part of the gulf, set in by wind and current from the Baltic, and at times without warning, against the wind. Ice, at times causing floes to pile-up with wind and current, is a menace to shipping. Icebreakers attempt to keep open the ports of Riga and Parnu.

CAUTION

10-6 Local Magnetic Disturbances are reported to exist in the southeastern part of the Gulf of Riga.

PART A WESTERN APPROACHES TO THE GULF OF RIGA AND THE WESTERN COASTS OF SAAREMAA AND HIU-MAA

10A-1 IRBENSKIY STRAIT is the western and main entrance to the Gulf of Riga. It is bound southward by the mainland extending from Ovisi to Kolkasrags, about 31 miles east-northeastward. Sorve Peninsula, about 23 miles north-northeastward of Ovisi, lies at the northern extremity of the strait. The shores of the strait are low with no natural landmarks.

Numerous shoals and dangers lie in the approaches and entrance of Irbenskiy Strait. Two channels lead between these dangers.

OVISI (57°34'N., 21°43'E.), a low, sandy cape is the southwestern entrance of the strait. It is very noticeable due to its light color and backing of woods. A light is shown and a fog signal is sounded from a tower, with a radar reflector, close inshore of the cape. Storm signals are shown from a mast near the light tower.

IRBENSKIY LIGHTSHIP (57°51'N., 21°37'E.), about 17-miles northward of Ovisi, has a red hull with white superstructure and the name "IRBENSKIY" painted in black letters on sides of hull. A radiobeacon transmits and a fog signal is sounded at the lightship, which is replaced by a lighted buoy during the winter.

COAST-GENERAL

10A-2 See section 10-1.

DEPTHS-DANGERS

10A-3 There are depths of 10 to 16 fathoms in the eastern part of Irbenskiy Strait. In the western part there are variable depths inside the 20-fathom curve where there are innumerable shoals. The 10-fathom curve, from about 5 miles northwestward of Ovisi, contains the shoals extending northward of the mainland. Shoals extending about 13 miles southwestward of Sorve Poolsaar (sec. 10A-9), 10 miles eastward of Saaremaa (sec. 10A-10), and 8 miles eastward of Kopu Poolsaar (sec. 10A-13), are closely contained by the 10-fathom curve. The principal shoals are described with related features, but all are best seen on the chart.

CAUTION.—Many of the charted aids to navigation are undependable.

DANGERS.—Ovisu Seklis, a rocky and sandy shoal extending about 5 miles northwestward of Ovisi, has depths of 1 1/2 to 5 fathoms. Buoys mark the extremities of the shoal. Michailovsk, the northernmost of several shoals extending 4 to 7 miles northward of Ovisi, has several 2 1/2-fathom patches. Buoys mark the eastern side of the shoals on which lie several sunken wrecks. Vinkovi, a bank with a 4 1/4-fathom and 5-fathom patches, is marked by a lighted whistle buoy with a radar reflector moored about 11 1/2 miles northwestward of Ovisi.

OFFLYING DANGERS

10A-4 Apollon, a bank with a least depth of 7 fathoms, lies about 23 miles west-northwestward of Ovisi. Chidovi Nova, with a least depth of about 11 fathoms, lies 25 1/2 miles northwestward of Ovisi. A 6-fathom patch lies about 4 miles eastward of the bank.

NAVIGATION

10A-5 See NEMEDRI and section 10-2. The coastal track from Irbenskiy Lightship leads on course 350° for 53 miles, over a least depth of 9 fathoms, to the offshore track in position 58° 43'N., 21°19'E.

CURRENTS

10A-6 See section 10-4. The north-going current flowing along the western coast of Saaremaa (sec. 10A-10), joins the current setting out of the Gulf of Riga off the southern end of Sorve Poolsaar (sec. 10A-9), and forms the shoal banks in the entrance of Irbenskiy Strait. The direction and strength of the wind influence these currents.

WINDS-WEATHER

10A-7 See section 10-3.

ICE

10A-8 See section 10-5.

COASTAL FEATURES-LANDMARKS

10A-9 BETWEEN OVISI AND SORVE POOLSAAR (57°55'N., 22°04'E.), lies the entrance to the Gulf of Riga. The Sorve peninsula extends about 16 miles south-southwestward from the island of Saaremaa at its southwestern end. There are a few villages on the peninsula which is low and sparsely wooded except in the northeastern part where fir trees grow on hilly ridges.

Sorve Light is shown from a tower at the southern extremity of the peninsula. A radio-beacon transmits at the light tower. A prominent building stands nearby. Ice signals for the entrance to and within the Gulf of Riga are shown near the light tower. An obstruction lies 6-miles east-southeastward of the light.

Sorve Ots, a narrow, above-water sandy spit, extends about 1 mile southward of the peninsula. Sorve Riff, an above- and below-water shoal of rocks and sand, extends about 8 miles south-southwestward from Sorve Poolsaar. There are depths of 5 to 6 fathoms on the outer sides.

Beresinimadilik, with a least depth of about 2 fathoms marked by a buoy, lies 11 1/2 miles southwestward of Sorve Poolsaar. Several shoals with depths less than 3 fathoms, marked by buoys and best seen on the chart, lie southeastward of Beresinimadilik.

CHANNELS.—The main channel from seaward through Irbenskiy Strait (sec. 10A-1), leads from Irbenskiy Lightship through a channel about 1 mile wide, with a least depth of 49 feet. A course of 143° from the lightship leads between lighted buoys moored on

the sides of the channel, close to Michailovsk (sec. 10A-3) and Berisinimadilik shoals. Detached 5-fathom patches lie nearby. A secondary channel, about 1 1/3 miles wide with a least depth of 28 feet, leads from 3 miles eastward of Vinkovi (sec. 10A-3) between buoys marking patches 5 and 7 miles northward of Ovisi. This channel joins the main channel about 8 miles northeastward of Ovisi (sec. 10A-1).

SORVE POOLSAAR—western side.—The western side of the peninsula is indented by several rocky bights, backed by low wooded terrain, and fronted by above- and below-water reefs extending 1 1/2 miles offshore. Lou Laht indents the coast about 10 miles northward of Sorve Light. Range lights lead through a buoyed channel to an anchorage. The western entrance point of the bay and a church spire at Jamaaja (58°01'N., 22°03'E.), are conspicuous landmarks. Tiriu Light is shown from a cape about 5 miles north-northwestward of Sorve Light. A beacon stands on the coast about 2 miles northeastward of Tiriu.

10A-10 SAAREMAA—Western side.—The Estonian island of Saaremaa, of limestone formation and thickly wooded, is roughly indented by numerous bights formed by peninsulas. The inhabitants of this low, flat island are engaged in agriculture, cattle raising and fishing. From the root of Store Poolsaar (sec. 10A-9), the coast extends northwestward for about 15 miles terminating at Meelaiuneem Point. Rocks and shoals front the coast extending in places to the 5-fathom curve about 3 miles offshore. There are no harbors or landmarks. The village of Karala (58°16' N., 21°55' E.), is located on high ground visible from offshore. A light is shown at Karala. A beacon stands 7 1/2 miles southwestward of the inlet.

The rocky coast between Karala Inlet and Meelaiuneem Point, about 3 miles north-northwestward, is backed by a ridge and fronted by shoals of less than 4 1/2 fathoms extending southwestward and northwestward for about 7 miles. The 10-fathom curve lies close seaward. Several patches of 1 fathom or less, on which the sea breaks, are marked by buoys about 5 1/2 miles southwestward of the point. Low, grassy islets lie on the outer

edge of foul ground extending about 3 1/2 miles northwestward of the point. Two range beacons stand at the eastern extremity of Loonalaid (58°20'N., 21°47'E.), the largest inhabited islet. Uuskniv, a detached rocky 2 1/2-fathom patch, marked close westward by a lighted whistle buoy with a radar reflector, lies about 7 1/2 miles west-southwestward of Loonalaid. A 5 1/2-fathom shoal, marked close northwestward by a buoy, lies about 13 miles west-southwestward of Loonalaid and a 4 3/4 fathom patch lies about 19 miles westward of the islet.

TAGAMOISA POOLSAAR.—This broad peninsula, a coastal feature extending about 8 miles northward from the northwestern side of Saaremaa is low on the western side. High, rocky slopes on the eastern side rise to steep, limestone cliffs which fall away to a low, wooded coast nearing the root of the peninsula. A barren ridge on the northeastern part of Tagamoisa is a prominent landmark. Harilaid, a low peninsula forming the western extremity of Tagamoisa, and joined to it by a narrow isthmus, appears as an island from offshore. Kiipsaare Light (58° 30'N., 21°51'E.), is shown from a tower on the northwestern point of Harilaid. Foul ground, with depths of less than 4 fathoms, extends about 4 miles northwestward of Kiipsaare light tower. Buoys mark the northern and western sides of the foul ground.

CAUTION.—During stormy weather, a strong current flows in the vicinity of Kiipsaare. Ships in the area should keep seaward of the 10-fathom curve lying about 4 miles offshore.

The foul ground off Harilaid continues along the western side of Tagamoisa Poolsaar, extending about 12 miles offshore between the root of that peninsula and Meelaiuneem Point, about 7 miles southwestward. The low, wooded intervening coast is indented by three foul bights with outlying islets. There are several villages along the coast and on peninsulas between the bights.

10A-11 VILSANDI (58°23'N., 21°49'E.), a low, partly wooded island encircled by foul ground, lies about 4 1/2 miles northward of Meelaiuneem. A light is shown and a radio-beacon transmits from a lighthouse at the

western extremity of the island. Local craft berth at piers on the southern and western sides of Vilsandi. Patches, some marked by buoys, best seen on the chart, lie in the approaches to the island.

Offlying dangers include Mustpank and Suurkuiv, the former a detached 4 3/4-fathom shoal and the latter a 1-fathom rocky patch each marked by a buoy moored about 5 and 10 miles westward of Vilsandi, respectively. Rabinakalju, rocks awash, lie about 5 miles northwestward of Vilsandi. A buoy marks the southern side of the rocks.

Atla Laht, a bight approached between Loonalaid (sec. 10A-10) and the western side of Vilsandi, has depths of 2 to 2 3/4 fathoms in the fairway leading to a boat pier. Range beacons on Loonalaid, and on a peninsula forming the eastern side of Atla Laht, and at the head of the bight, lead into the center of the bay.

Kihelkonna Laht, a foul bight southeastward of Vilsandi, is approached between the eastern side of the island and Harilaid, about 4 1/2 miles northward. A church spire in Kihelkonna, a town located at the head of the bay, is conspicuous. A submarine cable is laid across the bay southward of the anchorage. The bay, and approaches thereto, are seldom effected by the ice which blocks shipping in the northern approaches to the Gulf of Riga.

Jaagurahu (58°24'N., 21°58'E.), located 2 miles eastward of Vilsandi, has a pier about 750 feet long with 16 feet at its head and 10 feet alongside. A light is shown from the head of the pier.

10A-12 From Harilaid (sec. 10A-10), the northwestern coast of Saaremaa trends about 24 miles east-northeastward to Pammana, a cape at the southern side of Soela Vain (Sound). This stretch of high coast is generally steep and indented by bays. A foul bight lies between Harilaid and Undva, the northern extremity of Tagamosia Poolsaar (sec. 10A-10).

Tagalaht is a bight entered between the northeastern side of Tagamoisa and Merise, a point about 4-miles eastward. A light is shown from the point. White, sandy cliffs rise near the middle of the western shore of Tagalaht. The eastern shore is low and wooded.

Kudemaa Laht is entered between Ninase Pank, the northern end of a peninsula about 4 miles northeastward of Merise, and Panga (58°34'N., 22°18'E.), a point 3 miles north-eastward. A light is shown from Panga. Both sides of the entrance are faced by steep cliffs. The shores of the bay are low, wooded and fronted by rocky shoals. A prominent church appears above the trees within the head of the bay and the village of Ninase is conspicuous on the western shore.

Pammana Nina (58°38'N., 22°35'E.), the low, flat northern extremity of Pammana, is located about 9 1/2 miles east-northeastward of Panga. The intervening coast is indented by a broad bight backed by a low, wooded shore and fronted by rocky shoals extending close-to the 5-fathom curve about 1 mile offshore.

Raudrahu, a group of above- and below-water rocks about 4 miles west-northwestward of Pammana, lie near the western end of shoals less than 3-fathoms deep extending eastward and northwestward of the rocks. Buoys mark the northwestern side of the shoal and a 1-fathom patch about 1 1/2-miles southwestward of Raudrahu. Wrecks and detached patches in the area are best seen on the chart.

10A-13 HIIUMAA—Western side.—The Estonian island of Hiiumaa lies with its southern end about 3 miles northward of Saaremaa. The terrain, flat and marshy in the interior, rises gradually northward. The western and northwestern sides of Hiiumaa are lower in height and less wooded than elsewhere. Parts of the southwestern coast are only slightly above high-water level, appearing as a chain of low-lying islands from offshore. The inhabitants of Hiiumaa are engaged in fishing, agriculture, and cattle raising.

Tohvri Nina (58°42' N., 22°30' E.), about 4 1/2 miles north-northwestward of Pammana Nina (sec. 10A-12), is the southwestern extremity of Hiiumaa. Between Tohvri Nina and Haldi Nina, about 6 1/2 miles northward, the coast is low, flat and fronted by rocky, shallow bights with shoals of less than 5 fathoms extending about 5 miles offshore. A rock, with a depth of 1 fathom over it, marked by a buoy, lies 2 miles west-south-

westward of Tohvri Nina. A 3 3/4-fathom patch lies close-to the 10-fathom curve about 6 miles northwestward of the same point. Chaldriku Light is shown from a point about 1 1/2 miles south-southeastward of Haldi Nina.

Hundstik Laht, a broad bight formed by the coast northward of Haldi Nina has depths of 3 to 5 fathoms but is encumbered with rocky shoals of less than 1 fathom. The bight is backed by a low, wooded rocky shore and several villages. Two hills about 2 miles southeastward of Tammistu, a village at the northeastern corner of the bight, and a church spire about 1 1/4 miles east-northeastward of the village, are prominent.

Hundstik, a rocky ledge, awash, lies in the center of the bay about 4 miles northwestward of Haldi Nina. Shoals of 1 fathom, or less, lie up to 3 miles southward of the rock. A buoy marks the southwestern side of a 1 1/2-fathom shoal lying about 7 1/4 miles west-northwestward of Haldi Nina. A detached 3 1/2-fathom shoal, marked by a buoy close northward, lies about 13 miles westward of Haldi Nina.

KOPU POOLSAAR, a densely wooded salient peninsula rising about 225 feet, extends westward from Tammistu, forming the northern side of Hundstik Laht. The southern coast of the peninsula is irregular and rocky in most places. Foul ground and shoals of less than 2 fathoms extend about 2 miles seaward of Kaleste (58°55'N., 22°08'E.), a village 7 1/4 miles westward of Tammistu. A beacon stands on the shore about 1/2 mile south-southeastward of the village. Kopu Light is shown from a tower at the end of a range of hills extending 5 miles eastward from Ristna.

RISTNA, the western extremity of Kopu Poolsaar, is formed by Louna Ristna Nina and Pohja Ristna Nina, two low points strewn with boulders. Ristna Light is shown from Pohja Ristna Nina, the northern point. A fog signal is sounded, a radiobeacon transmits, and a signal station is located at the light tower.

Foul ground, with depths of 1 fathom and less, extends about 1 1/2 miles off Ristna. Buoys mark the seaward edges of the area. Detached shoals of about 5 fathoms, marked by buoys, lie up to 7 1/2 miles west-south-

westward of Ristna. Shoals of less than 5 fathoms lie about 2 1/4 miles northward of Pohja Ristna. A 4-fathom patch about 2 1/2 miles west-southwestward of Kaleste Beacon lies about 1 mile southward of the anchorage (10A-15).

The northern side of Kopu Poolsaar, extending about 11 miles eastward from Pohja Ristna Nina, is fronted by rocks and shoals lying up to 1 1/2 miles offshore. Luidja Laht, a bight at the eastern end of the peninsula, is entered between Palli Nina (58°57'N., 22°20'E.) and a coastal spur about 3 miles northeastward. A 3 1/4-fathom shoal lies about 2 1/2 miles northward of Palli. Foul ground, partly awash and marked by a buoy close seaward, extends 3 miles northwestward of the neck. Luidja Light is shown from the head of the bay.

10A-14 From Luidja Laht the coast turns northeastward for about 11 miles to Tahkuna Nina, a low, wooded point. The intervening coast is indented with several foul bights fronted by shoals with a least depth of 2-feet extending about 1 1/2 miles northward of Kootsaare Nina (59°02'N., 22°29'E.), and marked by a buoy at the western edge.

Hiumadal, an extensive shoal with several rocky heads and a least depth of 4 feet, lies about 4 to 8 1/2 miles off this stretch of coast. Several buoys, best seen on the chart, mark the sides of the shoal which breaks during onshore gales. In calm weather the white bottom of the shoal is seen from the offing.

Reigi Laht, encumbered with rocky shoals, is entered southward of Kootsaare Nina. A pier, with 7 feet at its head, is located near prominent buildings at the southwestern side of the bay. Reigi Church, standing on a ridge at the southeastern side of the bay, is conspicuous.

TAHKUNA NINA (59°06'N., 22°36'E.), the northwestern point of a broad peninsula forming the northern extremity of Hiumaa, is visible from about 15 miles offshore. The low coast in the vicinity is sandy. Above- and below-water rocks front the point. A 2 1/2-fathom shoal, marked by a buoy, lies about 2 miles westward of the point. A light is shown from Tahkuna. There is a signal

station near the lighthouse. Ice signals are also shown at the station.

Vinkovi, a shoal with a least depth of 4 1/4 fathoms, marked by buoys, lies about 10 miles northwestward of Tahkuna. A 2 1/2 fathom patch, marked close northeastward by a buoy, lies 1/2 mile northward of Vinkovi. Glotovi, a 4 1/2-fathom shoal lying 11 miles northwestward of Tahkuna, is marked close westward by a buoy and on the northern edge by a lighted whistle buoy with a radar reflector.

CAUTION.—Fog frequently prevails near the northwestern coast of Hiumaa. Dense fog is most frequent during April.

ANCHORAGES

10A-15 Lou Laht.—Sheltered anchorage can be taken in 3 to 4 fathoms, sand and mud, near the center of the bay.

KARALA.—Small craft can anchor in Karala Inlet, about 1 mile westward of the village.

ATLA LAHT.—Sheltered anchorage can be taken in 2 fathoms, sand, in the fairway of the bay.

KIHELKONNA.—Range lights, in and near the town, lead to a sheltered anchorage in 6 to 7 fathoms, sand, about 1 mile northward of the northeastern point of Vilsandi.

JAAGURAHU.—Anchorage can be taken in about 3 fathoms, sand and mud, 1/2 mile southward of the pierhead.

TAGALAHT.—Tenable anchorage can be taken in 8 to 10 fathoms, sand and mud, about 2 1/2 miles southwestward of Merise, also in 3 fathoms near the head of the bay.

KUDEMAA LAHT.—Tenable anchorage can be taken in 7 to 11 fathoms, sand, in the middle of the bay between Ninase and an islet lying off the eastern shore. Northerly and northwesterly winds raise a rough sea. Sheltered anchorage for small vessels can be taken in 2 fathoms, sand, southeastward of the islet.

HUNDSTIK LAHT.—Sheltered anchorage can be taken in 2 1/2 to 4 fathoms, southeastward of Haldi Nina.

KALESTE.—Anchorage, open to southwest-erly winds, can be taken by small vessels in 3 fathoms, sand, off Kaleste Village. Kopu lighthouse, aligned 071° with the beacon on the shore southward of the village, leads in

the anchorage approach. Anchorage, sheltered from northeasterly winds, can be taken about 1 mile offshore in 9 to 11 fathoms with Kopu and Ristna lighthouses bearing 078° and 352°, respectively.

LUIDJA LAHT.—Anchorage, open to northwesterly winds, can be taken in about 4 fathoms, sand, near the middle of Luidja Laht.

REIGI LAHT.—Anchorage can be taken in 2 fathoms, good holding ground, near the middle of the bay.

PART B. GULF OF RIGA

10B-1 A general description of the Gulf of Riga is given in section 10-1. The seaward entrance and adjacent coast is described in sections 10A-1 and 10A-9, respectively.

COAST—GENERAL

10B-2 See section 10-1.

DEPTHS—DANGERS

10B-3 See section 10-1. Dangers off the eastern and western shores of the gulf lie within the 10-fathom curve, about 3 miles offshore. The numerous shoals and foul ground extending 8 to 17 miles off the northwestern and northeastern shores of the gulf are closely contained by the 10-fathom curve. Dangers are described with related features.

CAUTION.—Charted aids to navigation are not always dependable. Prohibited areas are subject to change without notice.

OFFLYING ISLANDS AND DANGERS

10B-4 Ruhnu Saar (57°48'N., 23°15'E.), lies almost in the middle of the Gulf of Riga. The western side of this inhabited Estonian island is low and barren; the eastern side is hilly, with wooded sand dunes and low, steep red cliffs. Foul ground extends about 2 miles off the western side of the island. The bottom is steep to at 1/2 mile off the eastern side. Banks, with depths less than 6 fathoms, lie about 3 miles northward and 5 miles southward of Ruhnu. A buoy marks the northern extent of the bank. Detached 1-fathom reefs and a 2 1/4-fathom patch, marked by a buoy, lying on the southern bank are best seen on the chart.

PROHIBITED AREAS.—Anchoring and fishing are prohibited in an area extending about 4 miles eastward of Ruhnu Saar. A Mine Exercise area lies 3 1/2 to 8 1/2 miles northeastward of the northern end of the island.

MEASURED DISTANCE.—A measured distance of 1.3-miles on course 323° is marked by beacons on the eastern side of Ruhnu Saar. Buoys moored 2 1/2 miles northwestward and southeastward of the island mark the ends of the measured distance.

Ruhnu Light is shown from a partly obscured lighthouse atop a hill at the southeastern side of the island. A light is shown from the head of a pier about 1,200 feet long extending off the southern end of the island.

NAVIGATION

10B-5 See section 10-2. From Irbenskiy Lightship (sec. 10A-1), steer a course of 143° for 13 1/2 miles through the entrance channel (sec. 10A-9) to close northward of No. 2 lighted whistle buoy (NEMEDRI). Thence steer 065° for 26 miles over a least depth of 7 1/4 fathoms to a position 6 miles northward of Kolkasrags Tower (57°46'N., 22°37'E.). From the latter position steer 136° for about 63 miles to the anchorage area off the port of Riga.

To arrive at the port of Parnu steer 125° for about 30 miles from 6-miles northward of Kolkasrags to a position 15-miles south-southeastward of Ruhnu Lighthouse (sec. 10B-4). Thence steer 061° for about 19 1/2 miles to 57°43'N., 23°55'E., over a least depth of 15 fathoms. From the latter position a course of 024° for 42 miles leads over a least depth of 3 1/4 fathoms in the approach fairway to port.

CAUTION.—A dangerous wreck and a 1-fathom patch, best seen on the chart, lie about 2 1/2 miles off the course line southward of Ruhnu Saar.

CURRENTS

10B-6 See section 10-4.

WINDS—WEATHER

10B-7 See section 10-3.

ICE

10B-8 See section 10-5. During most winters the shipping lanes to Riga are kept open by icebreakers.

COASTAL FEATURES—LANDMARKS

10B-9 BETWEEN OVISI (sec. 10A-1) and KOLKASRAGS, about 31 miles east-northeastward, the coast is low and sandy. Wooded sand dunes lie close inland backed by a range of hills with the western end terminating about 18 miles eastward of Ovisi. Slitere Light is shown from the western extremity of the range. Mazirbe Church (57° 40'N., 22°20'E.) is a prominent landmark.

Mikelbaka Light is shown from a tower with a radar reflector about 8 miles east-northeastward of Ovisi. A fog signal is sounded and a radiobeacon transmits at the tower. A boat landing nearby, with 5 feet alongside, can be approached with offshore winds. Sikraguciems and Saunaguciems Lights, with radar reflectors, are shown on the coast about 8 1/4 and 17 miles east-northeastward of Mikelbaka Light.

Shoals along this coast lie within the 5 fathom curve, lying about 1 1/2 miles offshore. A buoy marks a 3 1/2 fathom patch about 6-miles north-northeastward of Ovisi. Several wrecks, best seen on the chart, lie sunk near the 5-fathom curve. Dangerous wrecks, about 5 miles northwestward of Sikraguciems and Saunaguciems Lights, lie close southward of the fairway through Irbenskiy Strait. Lighted buoys mark the fairway (sec. 10B-5) in the vicinity of the wrecks.

KOLKASRAGS (57°46'N., 22°38'E.), the northern extremity of Latvia, is a low, sandy, sharply-defined cape backed by woods inland. A disused light tower (sec. 10B-5), in disrepair, stands on the cape. Churches, 1/2 mile southwestward of the tower, are conspicuous. There is a signal station on Kolkasrags. All ships are required to display their International Call Letters by flag hoist and signal their identity by Morse Code at night.

A reef, with depths less than 1 fathom, extends about 3 1/4 miles northward of the cape. Buoys mark the outer edges of the reef and a wreck close northwestward. Kolkasrags Light is shown from an islet at the northern extremity of the reef. A fog signal is sounded

and a radiobeacon transmits at the light tower. A signal station at the lighthouse transmits messages by International Code. A lighted buoy is moored 3/4 mile northward of the islet.

CAUTION.—The current between Ovisi and Kolkasrags is variable in direction and flows with a velocity of 1 to 1 1/2 knots. Prolonged westerly winds cause a northwesterly current to flow around Kolkasrags raising a confused sea in the vicinity of the reef. The variable current, accompanied by fog, in the approach channel from Irbenskiy Lightship (sec. 10A-1) is cause for concern. The radiobeacon at Mikelbaka is an aid to navigation in the area.

10B-10 BETWEEN KOLKASRAGS AND THE ZAPADNAYA DVINA (DAUGAVA) RIVER ENTRANCE, about 63 miles southeastward, the coast turns abruptly forming the southwestern side of the Gulf of Riga. Several villages are located along this low, sandy and unindented coast. There are occasional wooded hills. The local church steeples, also Kolkasrags and Mersrags Lighthouses, are prominent landmarks.

The coastal shoal, extending about 2 miles offshore, contains all dangers. The 10-fathom curve parallels the coast about 3 miles offshore.

CURRENT.—The current flows in the same direction as the wind, attaining a velocity of 1/2 to 1 knot.

A disused lighthouse stands at Melnsils, about 6 1/2 miles southward of Kolkasrags. Gipka Light is shown 5 1/2 miles further southward. Storm signals are displayed and a red light is shown at night near Gipka Light to aid fishermen.

Rojas Osta (57°31'N., 22°49'E.), is a fishing harbor formed by two breakwaters at the mouth of a river. Berths in the harbor have 5 to 7 1/2 feet alongside. Range lights lead through an entrance channel about 8 feet deep. A light is shown from the northern breakwater head.

MERSRAGS (57°22'N., 23°07'E.), is the northern extremity of a low, sandy, wooded cape fringed by rocks, awash, including a rock marked by a buoy about 1 mile northward of the extremity. A light is shown from Mersrags.

Mersraga Osta is a harbor about 2 miles southward of Mersrags. Two breakwaters

extending eastward from the harbor, which is the outlet of a river joining a lake to the westward. There are depths of 8 1/2 to 13 feet in the harbor. Vessels with a draft of 8 1/4 feet can enter through a fairway marked by range lights. Lights are shown from the head of each breakwater. Storm signals are displayed from a conspicuous mast. A signal station is located at the southern breakwater. Several rocky 1- to 5-fathom patches, marked by buoys best seen on the chart, lie up to 2 1/2 miles eastward and southeastward of the breakwaters.

RAGACIEMS (57°02'N., 23°30'E.), a low, sandy point, lies at the eastern end of a bight about 23 miles southeastward of Mersrags. A light is shown from the point. The low intervening coast is interspersed by cliffs and backed by wooded sand dunes. **Milzu Kalns**, an eminence marked by a tower, is a prominent inland landmark about 21 miles southward of Mersrags which is visible at least 20 miles seaward. Churches at **Sloka** and **Dubulti**, about 7 miles southeastward and 10 miles east-southeastward of Ragaciems, are conspicuous. A light is shown at **Engure** (57°10'N., 23°14'E.), a coastal village, and a mooring buoy lies 7-miles north-northeastward of the light.

A 2 1/2-fathom patch lies 2 miles south-eastward of Engure Light. Wrecks lie sunk in less than 4 fathoms about 4 miles south-eastward of Ragaciems. Anchoring and fishing are prohibited in an area about 1-mile square lying 6 1/4 miles north-northwestward of Ragaciems.

LIYELUPE, a river flowing parallel to the coast southeastward of Ragaciems, empties into the Gulf of Riga about 4 1/4 miles southwestward of the western breakwater forming the Daugava River entrance. Vessels with a maximum draft of 6 feet can cross the bar at the mouth of Liyelupe. **Bulli Light** is shown from the coast 1 1/2 miles southwestward of the entrance. **Bullu Rava**, a 5 1/2 fathom shoal, lies 3 1/4 miles north-westward of the light. The sandy coast between Ragaciems and Liyelupe, backed by wooded sand dunes, is a summer resort area with railroad connections to Riga. The **Bullupe River** is a northeasterly extension of the Liyelupe emptying into the Daugava near its mouth. Vessels with a draft of 10

feet and river ferries ply the Bullupe to summer resorts. Range lights and buoys mark fairways through the seaward entrance of Liyelupe and the various reaches of both rivers.

PORT OF RIGA (56°57'N., 24°-06'E.)

10B-11 The port of Riga, a river port at the head of the Gulf of Riga, is the largest commercial port of Latvia. Shipbuilding and ship repairs constitute a major industry.

NAVIGATION

10B-12 See section 10B-5.

WINDS-WEATHER

10B-13 Westerly winds may cause the water level to rise a maximum of 6-feet; easterly winds lower the level, at most, 3 1/2 feet. Spring thaws can raise the water level 10 feet above the mean.

ICE

10B-14 See section 10-5. The port may be closed to shipping during February and part of March. The situation depends on ice conditions in Irbenskiy Strait.

TIDES-CURRENTS

10B-15 Tides are negligible. The current in the river flows with a velocity of 1 to 2 knots but is very weak during the summer. In the spring, the current flows northwesterly across the entrance bar with a maximum velocity of 3 knots. A slight current sets southeastward over the bar with westerly and northwesterly winds. Easterly winds cause a westerly set with a velocity of 1 knot in the entrance and river.

DEPTHS-DANGERS

10B-16 The approach and entrance channels have a least depth of 28 feet, maintained by dredging. The controlling depth is 27 feet, but ships with a draft greater than this depth have berthed alongside with favorable weather conditions. The river has a least depth in the fairway of 27 feet for about 5 1/2 miles, where it decreases to 26 feet. **Milgravis**, about 3 miles southeastward of the entrance, has a controlling depth of 25 feet to the Chemical Works Quay.

A bar with depths less than 3 fathoms extends about 1 1/4-miles northwestward of the breakwaters. The dredged channel across the bar frequently changes in depth and direction due to currents and weather conditions. Lighted buoys, best seen on the chart, marking the sides of the channel and fairway in the river are shifted to accommodate changes in the channel.

A disused spoil ground, marked by a buoy near its northern limit, lies about 1 1/4 miles northward of the eastern breakwater.

ASPECT—LANDMARKS

10B-17 Entrance.—The entrance to Zapadnaya Dvina (57°04'N., 24°01'E.), lies between two breakwaters extending northwestward from the northeastern extremity of Daugavgriva Island on the southwestern side and the western extremity of Poluostrov Maugalsala Island on the northeastern side. Both islands are low and fronted by sand dunes. The old mouth of the river lying southeastward of Poluostrov is closed by a dam and filled with reeds.

The town of Daugavgriva is located on the island about 3/4-mile southward of the river entrance. Daugavgriva Fortress stands close northeastward of town. Southeastward of town, on the opposite bank of the Bullupe River (sec. 10B-10), is Bolderaya, a town connected to Daugavgriva by a railroad bridge.

Zapadnaya Dvina flows through a valley consisting of meadows, swamps, and sand hills. Many grassy, low islands and sandbanks lying in the river are inundated when ice melts in the spring.

LANDMARKS.—Daugavgriva Fortress, a red tower on Daugavgriva, a church on the eastern bank of the river and smokestacks in the city, are prominent.

HARBOR

10B-18 The port consists of an improved river harbor embracing a stretch of the Zapadnaya Dvina extending from the entrance to a railroad and highway drawbridge about 9 miles upstream.

The lower harbor, lying within the river entrance, extends along the river for about 3 1/2 miles to the entrance of Milgravis Canal, a branch of the river extending eastward to a shallow lake. A railroad-highway

bridge spans the canal near the lake. An overhead cable spanning the river near the junction, also spans Sarkandaugava midway. Daugavgriva Harbor, entered about 1/4 mile within the southwestern side of the river entrance, consists of 3-basins reserved for naval use, with depths of 8 to 30 feet, subject to silting. Bolderaya Harbor, with depths of 12 to 28 feet, is entered from the river adjacent to the basins, also from the mouth of the Bullupe River. Ships can turn in an area 1/4 mile wide in the main channel off the harbor.

The middle harbor, containing oil terminals and a large shipyard, extends along the river for about 3 miles. Milgravis and Sarkandaugava, branches of the river, also 2 basins leading off the eastern side northwestward of Milgravis entrance, are included in the middle harbor. The river has depths of 18 to 39 feet. Milgravis, with Sarkandaugava extending southward, have depths of 24 to 27 feet. Rinuzi Harbor (57°02'N., 24-05'E.), and Fishing Harbor basins have depths of 10 and 23 feet, respectively. A turning area at the southern outlet of Milgravis is about 250 yards wide with a controlling depth of 26-feet. Another turning area in the river opposite Rinuzi is 300 yards wide with a controlling depth of 28 feet.

The upper harbor, containing the principal general cargo quays, consists of a 2 1/2 mile stretch of the river and 4-basins. The river has depths of 18 to 30 feet. Export (Eksportnaya) Basin, about 3/4 mile southward of the southern entrance to Sarkandaugava, has depths of 21 to 29 1/2 feet. Export Quay adjoins the basin close northward. A turning area opposite Export Harbor is about 450 yards wide with a controlling depth of 24-feet. Andreyevskaya, 3/4 mile further southward of Export Basin, has depths of 10 to 26 feet. Agenskalns Inlet, with depths of 8 to 24 feet, lies on the western side of the river between a temporary pontoon bridge and the railroad bridge. The Cement Factory Basin, with depths of 7 to 22 feet, lies opposite the Export Basin.

TRAFFIC SIGNALS.—See section 1-94. Traffic signals are hoisted at the rear structure of the 141° -entrance range.

SIGNAL STATION.—There is a signal station (Int. Code), for ship-to-shore communication, close-to Daugavgriva mainlight.

STORM SIGNALS.—See section 1-83. Storm signals are displayed from the same structure as the traffic signals.

ICE SIGNALS.—When ice conditions make entrance to port dangerous, a red flashing light is shown at Daugavgriva main light structure in addition to the permanent light. If entry is impossible, the entrance range lights are extinguished.

REGULATIONS.—A copy of the Harbor Regulations in force are handed to Masters of ships on arrival. The following are excerpts from regulations: E.T.A. at No. 1 lighted whistle buoy shall be transmitted to the Captain of the Port 48 and 24 hours before arrival. The exact T.A., with a request for a pilot, shall be given 4 hours before arrival. The draft on arrival, cargo, and required services in port are forwarded with the initial message. Berthing shifts require pilots who determine the number of tugs to be used. The maximum speed permitted in the river is 6 knots.

AIDS TO NAVIGATION

10B-19 No. 1 lighted whistle buoy, with a radar reflector, is moored in the approach about 3 1/4 miles northwestward of the eastern breakwater. A radiobeacon transmits at the buoy. Daugavgriva main Light (57°04' N., 24°01' E.), is shown from a tower standing 1/2 mile southeastward of the western breakwater. A radiobeacon transmits at the tower. A light is shown from the head of the eastern and western breakwater. A fog signal is sounded at the latter.

Lights in Range, 141°, are shown close northward of Daugavgriva Light and about 1/4 mile southeastward. Lights in range, 128°, are shown 1/4 mile northwestward of Rinuzi Harbor (sec. 10B-18). Lights in range, 326°, astern, are shown about 1 mile northwestward of Rinuzi. Lights in range, 358°, astern, are shown close northward of the river entrance to Milgravis and eastward of Rinuzi. Various lights, best seen on the chart, mark the entrances to basins, branches, dams, revetments and the numerous quays.

PILOTS

10B-20 See section 1-107 and 10B-18. A watch is maintained by day and at night at the pilot station near Daugavgriva Light. Pilots can be obtained from the pilot vessel in the vicinity of No. 1 lighted whistle buoy. If weather conditions prevent boarding of a pilot, he will give pilotage directions from the pilot boat. If a pilot is unavailable, the inbound ship should not approach within a depth of 14 fathoms, nor pass southeastward of the lighted whistle buoy, which may be out of position following storms.

ANCHORAGE

10B-21 Anchorage, open to northerly winds, can be taken in 16 to 19 fathoms, in a charted area westward and northwestward of No. 1 lighted whistle buoy. The preferred anchorage is about 1 mile northwestward of the buoy.

Anchorage, open to northwesterly winds and seas, can be taken in the river between the middle of Poluostrov Mangal'sala (sec. 10B-17) and Rinuzi Church, about 2 1/2 miles within the entrance. This anchorage is preferred to others in the harbor area.

DIRECTIONS

10B-22 Consult NEMEDRI. From No. 1 lighted whistle buoy (sec. 10B-19), steer 141° on the entrance range passing between the lighted buoys marking the sides of the channel. When closing the breakwater entrance in mid-channel, steer 128° on the Rinuzi range alignment, passing close southwestward of lighted buoys No. 2 and No. 4. From the latter buoy bring the Mangal'sala range astern, 326°, steering to pass close eastward of No. 3 lighted buoy and close westward of the light marking the entrance to Milgravis. From No. 3 lighted buoy, steer 358° astern on the range alignment eastward of Rinuzi, passing close westward of No. 6 lighted buoy. Continue on this course to Export Quay and in midchannel to the first bridge.

FACILITIES

10B-23 RIGA, the capital of the Latvian-Soviet Socialist Republic, is a first port of entry with a population of about

675,000. The city is located on both sides of the Zapadnaya Dvina, with the old city on the eastern side connected to suburbs northeastward by several bridges spanning a canal. Other suburbs stretch westward of the old city. Riga is an industrial and manufacturing center. Of the numerous edifices, St. Peter's Cathedral near the pontoon bridge rises over 470 feet. The textile, leather, chemical, metal, and timber industries are important.

Exports include grain, coal, chrome ore, cement, lumber, and foodstuffs. Imports include cotton, hides, paper, sugar, and fruits.

BERTHS.—Export Basin has quays at least 875 feet long with 25 to 29 1/2 feet alongside. The adjoining Export Quay, close northward, fronts the river for about 5,000 feet with 28 feet alongside. It is used for passenger traffic, general and bulk cargoes. Andreyevskaya Quay, fronting the river between basins, is a general cargo and grain quay, about 3,300 feet long with 24 to 29 feet alongside. Customs Quay, on the river close southward of Andreyevskaya, is about 1,000 feet long with 28 feet alongside. Bridge Quay, fronting the western side of the river between bridges, is about 1,300 feet long with 18 feet alongside.

At the eastern side of the Milgravis-Sarkandaugava junction is an oil terminal with wharves up to 320 feet long and 25 feet alongside. Chemical Works Quay, at least 2,000 feet long with 21 to 30 feet alongside adjoins the oil terminal northeastward. It is a general cargo and oil bunkers berth. Ship repair quays on Milgravis, northward of the oil terminal, are 1,000 to 1,500 feet long with 17 to 18 feet alongside. Fishing Harbor quays are over 1,000 feet long with 23 feet alongside.

In the Naval Harbor there are river and basin quays about 1,500 and 1,100 feet long with 14 and 28 feet alongside, respectively.

There are numerous cranes of 2 1/2- to 50-tons capacity and many floating cranes with a capacity of 3 to 100 tons. The more important berths have railroad connections. Numerous tugs and lighters are available.

SUPPLIES.—Provisions and stores are plentiful. Potable water is piped to many berths. Fuel oil is available at Chemical Works Quay. There are water boats and oil barges.

REPAIRS.—Major hull and engine repairs can be made. There are several floating drydocks, at least three at Milgravis repair yard and one at the Naval Harbor. The largest has a capacity of 15,000 d.w.t. It is reported a floating drydock about 715 feet long and 133 feet wide, with two 15-ton cranes on the dock walls, is available in port.

COMMUNICATIONS.—The port and city is connected by railroad to the interior and with Baltic seaports. Shipping is carried on with all Baltic and North Sea ports. There is an airport near the harbor. Barge traffic is conducted with inland harbors.

DERATTING.—See section 1-15.

MEDICAL.—Hospitals are available.

EASTERN COAST OF THE GULF OF RIGA

10B-24 The eastern coast of the Gulf of Riga, extending northeastward for about 17 miles from the mouth of Zapadnaya Dvina, is moderately high and consists of partly wooded sand dunes. Thence the eastern shore of the gulf turns northward for about 55 miles to Parnu Bay. This stretch of coast is low and generally sandy, becoming rocky with low cliffs as it continues northward. Landmarks consist of local churches. All dangers lie inside the 10-fathom curve, lying about 2 miles offshore.

The Gauja River, marked by a beacon (57° 09' N., 24° 16' E.), is connected to Zapadnaya Dvina by several lakes and canals. There is a depth of 5 feet over the bar at the entrance, deeper inside, where there is a boat landing. A light is shown on the coast about 4 miles northeastward of the beacon and a prominent church steeple rises 4 miles northeastward of the light. A triangular prohibited area, the apex about 1 mile southwestward of the light, extends 10 1/2 - miles offshore.

SKULTES OSTA (57° 19' N., 24° 24' E.), is a fishing harbor at the mouth of a river formed by two breakwaters. There are depths of 6 1/2 feet in the entrance and 7 1/2 to 9 feet in the harbor. Lights are shown from the head of each breakwater. Range lights lead to the entrance and a light on the northern side of the river mouth leads into the harbor.

Tujas Pier extends offshore from a brickworks with a high chimney about 10 1/2 miles northward of Skultes Osta. A light is shown from the head of the pier. There are depths of 10 1/2 to 11 1/2 feet at the pierhead, ap-

proached with local knowledge over sunken rocks in the fairway. Lights are shown from the coast 3 miles northward and southward of the pier.

SALACGRIVA (57°45'N., 24°21'E.), is a town at the mouth of a river approached in a channel with a depth of 5 feet. There are depths of 3 to 10 feet in the harbor. Range lights lead through the entrance and a light is shown from the northern entrance bank opposite landing piers. Churches in town are conspicuous.

AINAZI (57°52'N., 24°21'E.), a coastal town with a harbor about 7 miles northward of Salacgriva, is situated close southward of the Latvian-Estonian border. The harbor is protected by a detached breakwater about 1/2 mile offshore and by drying reefs southward. The entrance channel, with a least depth of 11 1/2 feet, leads southward of the breakwater. Buoys mark the sides of the channel. Vessels with a draft less than 10 feet can enter the harbor and berth alongside a pier, in disrepair. A light is shown from the southern end of the breakwater. Range lights lead into the harbor.

DANGERS.—Shoals, fronting the coast between Salacgriva and Ainazi, extend about 5 miles northwestward of both harbors to the 10-fathom curve. There are depths of 1 to 5 fathoms, with a 1-fathom shoal marked by a buoy lying about 4 1/2 miles northwestward of Salacgriva. A 3 3/4-fathom shoal lies 3 1/2-miles northwestward of Ainazi breakwater and a 3 1/4-fathom shoal, marked by a buoy, lies about 2 3/4 miles from the breakwater.

CAUTION.—Fishing nets are laid up to 3 miles offshore between Zapadnaya Dvina and Parnu (sec. 10B-26).

10B-25 PARNU LAHT AND APPROACHES.—At Ainazi the low, partly rocky and wooded coast turns north-northeastward for about 23 miles to the entrance of Parnu Laht. This stretch of coast is fringed by rocky shoals of less than 3 fathoms extending about 2 miles offshore. There are numerous coastal villages but no important landmarks or harbors.

At Haademeeste (58°05'N., 24°30'E.), there are two conspicuous churches. Moisakula Light is shown on the coast about 1/2 mile

southwestward of the village. Bostri Madalik, a rocky 1 3/4-fathom shoal marked by a buoy close westward, lies about 3 1/2 miles offshore and 6 1/2 miles southwestward of Moisakula.

Pihinurme Maed, high sand hills about 3 1/2 miles northward of Haademeeste and 1 1/4 miles eastward of Pihinurme Point (58°08'N., 24°29'E.), are conspicuous landmarks. Pihinurme Madalik, a 2-fathom reef, extends about 2 miles westward of the point. The coastal bank, with a least depth of 4 3/4 fathoms extends about 6 miles west-southwestward of the reef.

PARNU LAHT, a bay lying at the northeastern end of the Gulf of Riga, is entered between Píkla Nina (58°15'N., 24°28'E.), and Songu Saar, an island about 8 miles westward. The shores at the entrance of the bay are indented and rocky but become regular and sandy ranging northward. The entire coastal terrain is low and wooded.

There are depths of 5 to 7 fathoms in the entrance to Parnu Laht, about 4 fathoms in the central part, sandy bottom, and 2 1/2 fathoms off the mouth of Parnu Jogi, a river emptying into the head of the bay.

The eastern shore of the bay between Píkla Nina and Tahku Nina, about 5 miles northward, is fronted by rocky shoals extending 2 miles offshore. Irmgardí Madalik, a detached 2 1/2-fathom patch marked close eastward by a buoy, lies about 4 miles northwestward of Píkla Nina. At Tahku Nina the shore turns abruptly northeastward and northward to Parnu. Local churches, indicated on the chart, are prominent landmarks.

The western shore of the bay is fronted south-southwestward by the off-lying islands of Kihnu Saar, Sorgu Saar, and Manilaid.

KIHNU SAAR (58°08'N., 24°00'E.), the outermost island, lies about 6 miles west-southwestward of Sorgu Saar. A church steeple in the middle of this low, wooded island is conspicuous approaching from the westward or southwestward. There are several villages on the island. Kihnu Light is shown from a tower at Mys Pikkani, the southern extremity.

Kihnu Krunt, a shoal with depths of 1 to 5 fathoms, extends about 6 miles southwestward of Mys Pikkani. This extensive shoal is marked by a lighted buoy at the southwest-

ern end and by spar buoys at the northern and northeastern ends. A dangerous wreck, with a depth of 4 feet over it, lies sunk about 9 miles westward of Kihnu Light.

Rocky above - and below-water shoals marked close southeastward by a buoy, extend about 2 miles off the eastern side of Kihnu Saar. Foul ground extends about 2 1/2 miles northward and 7 1/2 miles northwestward of Pilli Ots, the northern extremity of the island. Buoys mark the extremities of the foul ground.

Kihnu Harbor, about 3/4 mile southeastward of Pilli Ots, is formed by a breakwater and an elbow pier. There are depths of 3 to 8 1/4-feet alongside the seaward side of the pier. A light is shown from the pierhead.

SORGU SAAR (58°11' N., 24°12'E.), a low small island covered with bushes, is fringed with above- and below-water rocks. A landing is available at a sandy bay on the eastern side of the island. A light is shown from a tower at the northern end of the island. A lighted buoy, moored in the approach fairway to Parnu Laht, lies about 3 3/4 miles south-southeastward of Sorgu Saar, close eastward of a dangerous wreck.

Foul ground extends about 3 miles southward, northward and north-northeastward of Sorgu Saar. Buoys mark the northern sides of the ground.

MANILAID, a low island covered by bushes, lies about 3 miles northwestward of Sorgu Saar. A light is shown from the southern extremity of Manilaid. The northern side of the island is separated from Torila Ots (58°14' N., 24°07'E.), on the mainland, by a shallow channel. Foul ground encircles Manilaid. An intricate channel about 2 fathoms deep, marked by buoys close northward and southward, leads between the southern end of Manilaid and the foul ground extending northward of Kihnu and Sorgu Saar.

KIRIKU NINA, about 5 miles east-northeastward of Torila Ots, is a rather salient point from which a light is shown. The shore northward of Kiriku Nina is low and marshy to the head of the bay. Several rivers emptying into Parnu Laht form flats of less than 3 fathoms which extend about 3 1/4 miles offshore. Above- and below-water rocks lie on the flats between Torila Ots and Kiriku Nina.

Landmarks include a stone mill at Pootsi, about 4 3/4 miles westward of Kiriku Nina, and Saare Church, about 3 miles westward of the point.

CAUTION.—See section 10B-24. Prohibited areas, indicated by dashed lines on the chart, extend off the shores of Parnu Laht and approaches as far as 8 1/2 miles westward of Manilaid. Fishing nets are laid in the areas, which are to be entered only by fishing vessels.

PARNU HARBOR (58°23'N., 24°29' E.)

10B-26 Parnu Harbor, at the head of Parnu Laht, is located along the estuary of Parnu Jogi. This river port is the major fishing center for the Estonian S.S.R. and conducts a thriving lumber trade.

NAVIGATION.—See section 10B-5. From Riga No. 1 lighted whistle buoy, a course of 358° for 66 miles leads in the fairway to a junction with the western approach track. Thence a course of 024° on the approach range leads to the anchorage and pilot area.

WINDS-WEATHER.—Southwesterly winds raise the water level 2 to 3 feet above the mean level; northeasterly winds lower the level at least 1 foot. During spring thaws the river may flood part of the port area.

ICE.—The harbor is ice-bound from November to April. Because ice breaks-up in Parnu Laht about 11 days later than in the harbor, the ice blocks the river entrance causing the water level to rise as much as 12 feet, carrying ice-floes over the breakwaters and into the bay. In autumn, the river sometimes freezes so quickly that ships are compelled to depart port prematurely.

CURRENTS.—The numerous bends in the river cause varying currents between the low embankments and erosion of the river banks leading to a build-up of sand in the entrance and outer fairway, especially during the spring.

DEPTHS-DANGERS.—There is a least depth of 18 feet in the approach fairway and in the entrance fairway between breakwaters. Silting is constant, requiring periodic dredging. Ships with a draft of 17 feet can enter the harbor and berth alongside.

DANGERS.—Shoals of 1 fathom, or less, front the river banks. A spoil ground lies about 3/4 mile northwestward of the western

breakwater. A prohibited area extends from the entrance channel to the adjoining shores.

ASPECT—LANDMARKS.—The terrain in the vicinity of Parnu is low and marshy, with no natural landmarks. Church spires in town and about 4 miles northwestward of the breakwaters are conspicuous.

HARBOR.—The harbor consists of an outer stretch of the Parnu Jogi extending to the town drawbridge; the mouth of Sauga Jogi, a river leading off the northwestern side of the Parnu Jogi near the entrance, and Winter Harbor, on the eastern side, opposite the mouth of Sauga Jogi. The Parnu section, about 3 miles long, is used for general and bulk cargoes including fish and oil transfer. There are depths of 12 to 18 feet over sand and clay. The entrance lies between 2 parallel breakwaters extending about 1 mile offshore. There is a least width of 250 yards between breakwaters. Ships about 400 feet in length can be turned in the river at the junction of the Sauga. The river quays are located along the eastern bank to the drawbridge. A ferry plies the river about 1/2 mile above the bridge.

Sauga Jogi, spanned by a drawbridge at the entrance, has depths of 8 to 15 feet for about 3/4 mile. Fishing vessels berth at the quays inside the entrance and along the western bank of the Parnu Jogi outside the entrance.

Winter Harbor, with a general depth of 13 feet, is about 1/3 mile long. Fishing vessels are laid up during the winter in the harbor. Repairs are carried out at a small repair yard with a marine railway.

SIGNALS—REGULATIONS.—Storm signals (sec. 1-83) are shown from the front structure of the 039° range. Harbor regulations in force forbid vessels entering port without permission of the Port Captain. Overtaking ships is not permitted. Ship-to-shore communication is not allowed, except by tugs. A maximum speed of 5-knots is permitted. E.T.A. shall be transmitted 12 and 4 hours before arrival.

AIDS TO NAVIGATION.—Lights in range, 024°, shown from framework structures standing northward of the western breakwater head, lead in the approach fairway to port. Lights in range, 039°, shown from towers standing at the eastern side of the harbor,

lead through the outer part of the entrance channel. A buoy moored at the junction of the rangelines, marks the turn-off for the entrance channel. Lights in range, 026°, shown from framework structures standing at the northern side of the harbor, lead through the inner part of the entrance channel, and harbor.

A light is shown from the head of the eastern and western breakwater. The former is equipped with a radar reflector.

10B-27 PILOTS.—See section 1-107. Pilotage is compulsory. Pilots can be obtained from the pilot boat in the roadstead. The pilot station is located near the entrance of Winter Harbor.

ANCHORAGE.—Anchorage can be taken in 2 1/2 to 3 fathoms, sand and mud, about 1 mile west-southwestward of the western breakwater head. Anchorage, open to southerly and southwesterly winds, can be taken in 3 to 5 fathoms, good holding ground, anywhere in the roadstead of Parnu Laht.

DIRECTIONS.—From the "turning buoy" (sec. 10B-26), steer 039° on the entrance range leading between the breakwaters. When about 1/2 mile within the breakwaters, steer 026° on the inner range to river berths in the harbor.

10B-28 PARNU, with about 36,300 inhabitants, is situated on the southern bank of the Parnu Jogi, near the mouth of the river. The town and harbor, a first port of entry, is an industrial and fishing center. There are recreational facilities at nearby seaside resorts during the summer.

Exports include fish, flax and lumber products. Imports include fertilizers, general cargo and coal.

BERTHS.—West Quay, a general cargo, fish and lumber quay, close westward of the town drawbridge over the river, is about 1,100 feet long with 16 to 18 feet alongside. East Quay, adjoining West Quay is a general cargo and lumber quay about 880 feet long with 15 to 17 feet alongside. There are railroad connections to both quays. Ship's cargo gear is used.

Two piers opposite West Quay are used for bulk oil discharge and the unloading of fish. The former, with a T-head at least 65

feet long, has about 18 feet alongside. Bow and stern lines are secured ashore. The fish pier has a T-head at least 150 feet long with 18 feet alongside. There are several hundred feet of bulkheaded shoreline and small wharves used by the lumber and fishing industries for personnel and equipment. Tugs are available.

SUPPLIES.—Water is piped to West and East Quays. The river water is unfit for boilers. A limited quantity of provisions are available. Bunker fuels cannot be obtained.

REPAIRS.—Minor repairs can be made. The marine railway at Winter Harbor has a lifting capacity of 100 tons. There is a 50-ton floating crane in port.

COMMUNICATION.—The town is connected with the general railroad system. Shipping is conducted with various ports in the Baltic and North Sea.

DERATTING.—See section 1-17.

MEDICAL.—There is a hospital available in town.

NORTHEASTERN COAST OF THE GULF OF RIGA

10B-29 The northeastern coast of the Gulf of Riga from Torila Ots (sec. 10B-25) to Someri Poolsaar, about 13 miles west-northwestward, is low, partly marshy and indented by several bights. Wooded hills rise parallel to the coast about 1 to 3 miles inland. A high hill at Vaiste (58°21'N., 23°52'E.), one of several coastal villages, is quite conspicuous.

Tostamaa Laht, a shallow, rocky bight entered about 5 miles northwestward of Torila Ots, is fronted by foul ground extending 2 miles offshore. Heinlaid (58°17'N., 24°00'E.) a grassy islet lies near the outer edge of the foul area.

Vaiste Laht, with depths in the entrance of 3 1/4 to 4 1/4 fathoms, is entered about 4 1/2 miles northwestward of Heinlaid.

SOMERI POOLSAAR (58°20'N., 23°46'E.) is a low, grassy peninsula. A light is shown from the northwestern extremity of Someri. Rocky shoals, with depths less than 2 fathoms, extend about 3 miles southward and southeastward of Someri Poolsaar. A buoy marks the southern edge of the shoal.

Ipsimadilik, a shoal with a least depth of 2 fathoms, lies with its northern end about 4 miles southward of Someri Poolsaar.

Buoys mark the northern and western extremities of the shoal. The foul ground extending northward and northwestward from Kihnu Saar (sec. 10B-25), fronts the shore from Torila Ots to Someri Poolsaar and extends to within 1 mile of the southern side of Ipsimadilik.

KIHNU VAIN is a sound with a channel leading between the shoals extending from Kihnu Saar and the mainland northward. The channel, with a depth of about 24 feet, leads from close northward of Ipsimadilik to the channel close southward of Manilaid (sec. 10B-25). Fishing vessels, with local knowledge, can transit the channel which lies in a prohibited area (sec. 10B-25).

At Someri Poolsaar, the northeastern shore of the Gulf of Riga leads northward for about 11 miles to Paatsalu, a village at the head of a bight. The rocky shore has low, steep bluffs backed by a high ridge running parallel to the shore about 1 to 3 miles inland. Buildings standing on a high hill about 5 miles northward of Someri Light, and a windmill atop a hill at Paatsalu are conspicuous from the offing.

Numerous islets and rocks lie on the coastal shoal extending northward of Someri Poolsaar. Larinimadalik and Afanasjevimalalik are shoals of 11 and 25 feet lying 4 and 6 miles northwestward of Someri Light, respectively. A buoy marks the western edge of Afanasjevimalalik. Orikulaid (58°28'N., 23°38'E.), the largest of the islets off this coast, lies about 7 1/2 miles north-northwestward of Someri Poolsaar. Pooritsa Light is shown from an islet close westward of Orikulaid.

NORTHWESTERN COAST OF THE GULF OF RIGA

10B-30 The northwestern coast of the Gulf of Riga is formed by the eastern side of Sorve Poolsaar (sec. 10A-9) and the southeastern coast of Saaremaa (sec. 10A-10). Shoals extending as far as 10 miles offshore are described with related features.

The eastern coast of Sorve Poolsaar is low and marshy from the southern extremity of the peninsula to Kaavi Nina, a low point about 6 1/2 miles northeastward. A light is shown from the point. Shoals of less than 3 fathoms, on which lie above- and below-

water rocks, extend as far as 2 1/4 miles offshore. Kaavimadalik, a rock with a depth of less than 1 fathom over it, marked by a buoy 1/2 mile eastward, lies about 1 1/2 miles southward of Kaavi Nina.

MONTU, a small harbor formed by a mole, is located 3 miles southwestward of Kaavi Nina. There are depths of 9 to 18 feet along-side the inner face of the mole. Vessels can berth in 15 feet alongside the seaward side of the mole. A pier in the harbor has 7 feet alongside. Range lights, 313°, lead into the harbor through an approach channel with a least depth of 12 1/2 feet. Strong easterly winds make the harbor unsafe.

Ansekula, about 9 miles northeastward of Montu, is the northern end of a prominent row of densely wooded hills ranging from the vicinity of conspicuous white buildings in Montu Village.

Leeltserahu, rocky shoals with a least depth of 1 foot over them, extend about 3 1/2 miles southeastward of Kotkanina (58°05'N., 22°15'E.), a point close eastward of Ansekula. A 5-foot shoal lies about 2 miles eastward of Kotkanina. Buoys mark the seaward side of the shoals.

VEISERAHU, a rocky ridge with a least depth of 1 fathom over it, lies 8 1/2 miles southeastward of Kotkanina. A lighted buoy marks the southern end, and a spar buoy the northern end, of the shoal.

SUUR KATEL, a broad bight indenting the coast between Kotkanina and a small point 9 miles north-northeastward, is used as a loading place for vessels unable to berth in harbors near the head of the bay. The shore of Suur Katel is low, partly wooded and marshy. Abruksa Saar, a low, sandy island surrounded by rocks, lies about 4 miles offshore, at the southeastern side of the bay. Vahase Saar lies about 1/4 mile westward of Abruksa Saar. Foul ground extending 1 mile southwestward of Vahase Saar is marked by a buoy at its extremity. Kerju Saar, an islet awash, lies about 2 1/4 miles southeastward of the southern end of Abruksa Saar. A beacon stands on the islet and a buoy marks the eastern side of an encircling shoal. Kerju Rahu, a shoal with a least depth of 1 1/2 fathoms, marked by a buoy close westward, lies 2 3/4 miles southward of Abruksa Saar. Buoys mark the northern and northwestern edges

of shoals extending from the northern side of Abruksa. A light is shown from the southern end of Vahase Saar.

ROOMASSAAR (58°13'N., 22°30'E.), a coastal peninsula about 2 1/2 miles northward of Abruksa, and Looode Nina, 2 1/4 miles westward of Roomassaar, form the entrance of a small bay at the northeastern corner of Suur Katel. Roomassaar Harbor, at the southern end of the peninsula, is formed by a breakwater and pier extending southward. Vessels with a draft of 10 feet can enter the harbor or berth alongside the outer side of the pier. The harbor is approached from the eastward and southeastward through channels marked by buoys and lighted range beacons. Range lights shown from the eastern side of Abruksa lead in the easterly approach; range lights shown from Roomassaar lead through the southeasterly approach. A common channel, available to vessels with a draft of 10 feet, leads between buoys to port from 2 miles eastward of Abruksa. A lighted buoy, with a radar reflector, is moored on the southern edge of a 10-foot patch lying about 8 miles southeastward of Roomassaar and close northeastward of the entrance to the approach channel. A buoy marks the eastern side of a patch, with a depth of 9 feet, lying about 1/2 mile westward of the lighted buoy.

KINGISSEPP, the principal town of Saaremaa, is situated at the head of Suur Katel. The ruins of a castle and 2 churches in town are prominent from offshore.

Kingissepp Harbor, approached between Looode Nina and Roomassaar, is foul except for a narrow channel, with a least depth of 5 feet, leading along the western side of the bay. Fishing vessels enter the harbor and berth at a pier with a depth of 6 feet alongside. Two beacons standing close eastward of Looode Nina lead through a buoyed approach channel to Kingissepp Harbor.

VETELA NINA (58°13'N., 22°43'E.), is the southern extremity of Vatta Poolsaar, a broad peninsula about 6 3/4 miles eastward of Roomassaar. The intervening coast is low, marshy, indented by 2 bights encumbered by rocky shoals, and fronted by foul ground extending about 6 miles offshore.

Allirahu, a bare rocky islet lying about 8 miles eastward of Abruksa, is connected to Vatta Poolsaar by a shoal of less than 3 fath-

oms. Reefs, awash in places, extend as far as 2 1/4 miles off the islet. Buoys mark the outer extent of the reefs. A light is shown from the islet. An Explosives Dumping Ground lies between 2 and 3 miles east-southeastward of Allirahu.

10B-31 BETWEEN VETELA NINA AND KUBASSAAR, about 23 miles northeastward, the coast is low, indented by several rocky bights formed by flat, wooded peninsulas. Numerous shoals extend as far as 5 1/2 miles offshore. Landmarks include the various churches, the locations best seen on the chart, and a disused lighthouse tower at Laidunina (58°23' N., 23°05' E.).

Vetela Laht, a bay with depths of 3 to 6 fathoms, lies between Vetela Nina and Saaretukk, a low, rocky point about 4 1/2 miles northeastward. A light is shown from Saaretukk.

KOIGUSTE LAHT, a bay entered about 8 miles northeastward of Saaretukk, is approached from south-southeastward with the aid of range lights shown near the head of the bay. The shores of the bay are rocky and partly wooded. A fishing pier, with depths of 11 1/2 to 13 feet alongside, is located at the western side of the bight. The range lights lead through a fairway available to vessels with a draft of 8 feet. Piers project from an above-water spit at the front range light structure. Buoys mark the edges of shoals adjacent to the fairway. Allirahu (58°18' N., 22°58' E.), rocks above water, lie about 4 miles southward of the front range light structure. A light is shown from the rocks. Rocky shoals extending about 4 miles seaward of Allirahu are marked by a buoy on the southeastern edge.

KUBASSAAR (58°27' N., 23°19' E.), a low, wooded peninsula about 13 miles northeastward of Allirahu, is the eastern extremity of Saaremaa. The intervening coast is indented by several rocky, shoal inlets divided by peninsulas, of which Laidunina, marked by a disused light tower is the most prominent. This stretch of coast is fronted by shoals as far as 5 miles offshore. A detached 3 1/2-fathom shoal, marked by a buoy close eastward, lies almost 4 miles southeastward of Kubassaar. A light is shown from a tower at the southern extremity of the peninsula

which appears as an island from the offing. A radiobeacon transmits from the light tower. Udrikaid, a low, grassy islet with buildings, lies close westward of the southern end of Kubassaar.

ANCHORAGES

10B-32 RUHNU SAAR.—Anchorage sheltered from westerly winds, can be taken in 4 to 5 fathoms, sand, southward of the inner prohibited anchorage. Anchorage can also be taken in 5 to 10 fathoms, sand, about 1 mile off the pier; and in 6 to 10 fathoms, about 2 miles off the southwestern extremity of Ruhnu Saar.

KOLKASRAGS.—Anchorage sheltered from westerly and southwesterly winds, can be taken in 8 fathoms, sand, about 2 miles off the leeward side of Kolkasrags.

Anchorage can be taken in 10 to 15 fathoms, with offshore winds, anywhere off the western coast of the Gulf of Riga.

ROJAS OSTA.—Anchorage can be taken in 5 to 6 fathoms about 3/4 mile off the harbor.

PORT OF RIGA.—See section 10B-21.

SALACGRIVA.—Anchorage can be taken in 3 1/4 to 4 fathoms, rocky holding ground, about 2 miles offshore with Salacgriva Light bearing 082°.

AINAZI.—Anchorage can be taken in 4 to 4 1/2 fathoms, open to onshore winds and with fair holding ground, about 1 1/2 miles west-northwestward of the southern end of the breakwater.

HAADEMEESTE.—Anchorage can be taken in 1 3/4 fathoms, sand, about 1 1/2 miles westward of Moisakula Light.

PARNU ROADS.—See section 10B-27.

HEINLAID.—Anchorage can be taken in about 2 fathoms, sand, 3/4 mile eastward of Heinlaid.

VAISTE LAHT.—Anchorage can be taken in about 3 fathoms, sand and clay, 1 mile southward of Vaiste.

SOMERI POOLSAAR.—Anchorage can be taken by small vessels about 1 1/2 miles north-northwestward of Someri Light.

ORIKULAI.—Anchorage can be taken by small vessels about 2 miles northeastward and 2 miles southeastward of Poortotsa Light.

SORVE POOLSAAR.—Anchorage can be taken, sheltered from northwesterly winds,

in 5 to 9 fathoms, sand, between 1 and 3 1/2 miles southeastward of Sorve Light (sec. 10A-9).

MONTU.—Anchorage can be taken during fair weather about 1/2 to 1 1/2 miles eastward of the harbor.

SUUR KATEL.—Anchorage can be taken in 4 to 7 fathoms, sand and mud, southwestward of Vahase Light.

ROOMASSAAR.—Anchorage can be taken in 2 1/4 fathoms, sand and gravel, about 1 mile southwestward of Roomassaar.

VETELA LAHT.—Anchorage can be taken in 3 to 6 fathoms, sand, about 1 to 2 1/2 miles from the head of the bay.

PART C NORTHERN APPROACH TO THE GULF OF RIGA

10C-1 MUHU VAIN, a sound connecting the Gulfs of Riga and Finland, is bounded northward by an imaginary line joining Tahkuna Nina (sec. 10A-14) and Osmussaar (sec. 10C-14). The southern limit of the sound is bounded by an imaginary line extending northeastward to the mainland from Kubassaar (sec. 10B-31).

Harikurk (sec. 10C-12), a strait at the northern end of Muhu Vain, lies between Hiiumaa (sec. 10A-13), and Vormsi (sec. 10C-11). Viire Kurk is the strait between the southeastern part of Muhu and the mainland.

Voosikurk, a strait leading to Haapsalu (sec. 10C-14) lies between the eastern side of Vormsi and the western side of Noarootsi, a mainland peninsula.

Kassaare Laht, a bay entered between Hiiumaa and Saaremaa (sec. 10A-10), leads eastward to Muhu Vain. Soela Vain (sec. 10C-16) is the Baltic approach to Kassaare Laht.

COAST—GENERAL

10C-2 The shores of Muhu Vain are generally low and wooded, backed by forested hills and grazing land on the mainland. The islands in the sound are low and wooded, with fields and marshy land visible on the larger islands. Sand and clay form much of the shores.

DEPTHS—DANGERS

10C-3 There are depths of 30 to 48 feet in the channel leading through Harikurk and depths of 36 feet to 66 feet in Viire Kurk. The same channels are used between the Gulfs of Finland and Riga. Passage between the gulfs is controlled by a least depth of 15 1/2 feet in the channel leading through Muhu Vain to Viire Kirk. The channel from Harikurk leads across the central part of Muhu Vain with the aid of lighted range beacons, best seen on the chart, and through Viire Kirk. Buoys mark the channel which is very confined in places. Sand, mud and stones compose the bottom, with sand predominating, except near shoals where there is shingle and slate.

Numerous shoals and rocky patches lie in the approaches and adjacent to the various channels. All dangers are best seen on the chart, but those nearest fairways are described with related features.

CAUTION.—Passage through Muhu Vain is closed to navigation by all foreign ships. All such vessels should pass westward of Hiiumaa and Saaremaa.

OFFLYING DANGERS

10C-4 Apollo, rocky heads with a least depth of 2 3/4 fathoms, lie about 11 1/2 miles northeastward of Tahkuna Nina (sec. 10A-14). A lighted whistle buoy, with a radar reflector, marks the northern side of the rocks and a spar buoy the southeastern side, respectively.

Serbini, with a least depth of 7 fathoms, lies about 9 3/4 miles north-northeastward of Tahkuna Nina.

NAVIGATION

10C-5 Consult NEMEDRI and section 10-2. From a position in 58°43' N., 21°19' E. (sec. 10A-5), a course of 041° for 42 miles leads to a position in 59°15' N., 22°12' E. Thence variable courses to pass northward of the offlying dangers lead to the entrance of Muhu Vain.

CURRENTS

10C-6 The current in the northern approaches to Muhu Vain sets west-northwest-erly in calm weather with a velocity of 1/4

knot, increasing to 1 knot with northerly winds. Dividing at the sound entrance into two streams, the eastern of which flows through Voosikurk with a velocity greater than 1 knot following strong westerly winds. With strong southwesterly winds the current sets northward attaining a velocity of 3 knots. The western stream flows through Harikurk, setting southeastward at 1 1/2 knots. Through the center of Muhu Vain the current decreases and flows westward through Kassaare Laht. A current flowing northward from the Gulf of Riga attains a velocity of 1 1/2 knots in Viire Kirk with southerly winds.

A change in current direction indicates the direction from which strong winds can be expected. When these winds lose their strength or calm prevails, the current changes direction or ceases, respectively. The beginning of a current is noticeable hours before a change in wind direction. A southerly current appears before northerly, and especially northeasterly, winds.

WINDS-WEATHER

10C-7 Southwesterly winds prevail. During the spring and summer, easterly and northeasterly winds bring dry, clear weather. Strong southerly and southeasterly winds are accompanied by precipitation. Dense fog appears early in the summer when the water temperature begins to rise. During the autumn, fog appears with southerly and southwesterly winds.

The water level in Muhu Vain falls with easterly and northeasterly winds, sometimes 3 feet below the mean; southwesterly and westerly winds raise the water level. Mean variation averages about 2 feet.

ICE

10C-8 Ice appears in November and either impedes or stops shipping in Muhu Vain until April, depending on the severity of the winter.

PILOTS

10C-9 Pilots for Muhu Vain can be obtained in the vicinity of Osmussaar (sec. 10C-14), and from Parnu (sec. 10B-27).

COASTAL FEATURES-LANDMARKS

10C-10 BETWEEN TAHKUNA NINA (sec. 10A-14) AND HELTERMAA (58°52'N., 23°04'E.), the northeastern and eastern coast

of Hiiumaa is low, wooded and in places backed by hilly ridges. A morning haze frequently obscures this coast, especially with northerly winds. There are no natural landmarks. Dangerous shoals front the coast.

LEHTMA NINA, about 3 3/4 miles east-southeastward of Tahkuna Nina, is the easternmost point of a broad peninsula. A beacon (tower) marks the point. Near the beacon a pier about 525 feet long with 5 to 7 1/2 feet alongside extends offshore. A rock, with a depth of 5 feet over it, lies near the pierhead.

KARDLA, a village at the head of a bay indenting the coast for about 6 miles southward of Lehtma Nina, is approached through channels with the aid of range beacons. A chimney in the village is conspicuous. The north-northwestern channel has a least depth of 14 feet; the northern, 24 feet. A pier, in disrepair, extends 1/4 mile offshore. There is a shallow landing place for fishing vessels nearby. Numerous rocks, and shoals with depths of about 3 fathoms, lie close to approach channels. A light is shown from Hiiesaae Nina (59°00' N., 22°52' E.), the extremity of the bay, about 2 3/4 miles eastward of Kardla.

SAARE NINA (58°59' N., 22°58' E.), about 3 1/2 miles east-southeastward of Hiiesaae Nina, is a sharp point at the eastern end of a bight extending from Hiiesaae. There are depths of 5 to 6 1/2 fathoms in the bay. Voirahu, rocky shoals with a least depth of 2 feet extends about 2 1/4 miles northward of Hiiesaae Nina. Buoys mark the northern and eastern sides of the shoals. Selgrahu, above- and below-water reefs, extend about 3 miles northward, thence 5 miles northwestward of Saare Nina. Buoys mark the sides of the reefs about 2 1/2 miles northward of Saare Nina. Pussirahu, a drying reef, lies at the eastern end of Selgrahu and about 7 miles eastward of Lehtma Nina.

SUURSADAM (58°59' N., 22°56' E.), a fishing harbor is located about 2 3/4 miles southeastward of Hiiesaae Nina and 1 1/4 miles southwestward of Saare Nina. There are depths of 8 to 10 feet in the harbor. A pier in disrepair, has a least depth of 7 feet alongside. Another pier has depths of 5 to 6 1/2 feet alongside. Range beacons at the head of the harbor lead to the piers. A beacon standing about 1/2 mile southwestward of Saare Nina is a prominent leading mark approaching the harbor, as is Palu-

kula Church, standing about 1 1/2 miles southwestward of Hilesaare Nina. Vessels, with local knowledge and a draft of 11 and 16 feet, can approach the harbor from the northeastward and northward, respectively, and anchor in the roadstead (sec. 10C-18).

The COAST between Saare Nina and Heltermaa, about 8 miles south-southeastward, is fronted by islets, with shoals of less than 3 fathoms extending as far as 3 1/2 miles offshore. Landmarks include high woods at Vahtrepa, a coastal village 5 1/2 miles from Saare Nina, and Puhalepa Church spire, about 2 miles southwestward of Vahtrepa. Kuri Church, westward of Tahva Nina, a point about 1 1/2 miles south-southeastward of Saare Nina, is conspicuous.

Submarine cables are laid between Saare Nina, Tahva Nina and Vormsi (sec. 10C-11). Anchoring and Fishing are prohibited. Kadakalaid, islets surrounded by foul ground, lie in the prohibited area about 1 1/2 miles eastward of Saare Nina. Vohilaid, a large grassy islet lies close offshore with its southern extremity about 2 miles northward of Heltermaa.

HEILTERMAA is formed by a pier extending northward. Berths are available in 7 to 10 1/2 feet at the seaward end of the pier. A fairway buoy is moored about 3 1/2 miles east-northeastward of the pierhead. A light is shown from the pier and range lights lead through the approach channel, at least 8 1/4 feet deep and marked by buoys.

VORMSI

10C-11 Vormsi is a wooded island lying in the northern part of Muhu Vain, about 5 3/4 miles east-northeastward of Saare Nina (sec. 10C-10).

Landmarks consisting of wooded heights, churches, and light structures are described with related features.

The northern side of Vormsi is indented by inlets fronted by numerous shoals with depths of less than 3 fathoms, marked by buoys, extending about 4 1/2 miles offshore.

RALBY LAHT, a bay in the middle of the northern side, has depths of 10 to 21 feet and is available to vessels with a draft of 10 feet. Range beacons at the western side of the bay lead through a buoyed channel to piers, in disrepair, at the head of Ralby Laht.

KERSLI NINA (59°03' N., 23°11' E.), is the low northern extremity of Vormsi. Frisgrund, shoals with a depth of less than 3 feet, extends about 3 miles northwestward from Kersli Nina. Buoys mark the sides of the shoals. Nordvaina, with a least depth of 1 foot, on which the sea breaks, lies 5 3/4 miles north-northwestward of Kersli Nina. Buoys mark the edges of the shoal. Laine, patches with a depth of 2 to 4 1/4 fathoms, marked by a buoy, lie about 7 1/4 miles north-northwestward of Kersli Nina. A shoal with a depth of 2 1/2 fathoms, marked by 4 buoys, lies about 1 1/2 miles south-southwestward of Laine. Nordvaina lighted whistle buoy, with a radar reflector, is moored 1 3/4 miles westward of Laine Buoy. Plagurahu, a rocky shoal with a least depth of 1 fathom, marked close eastward by a lighted buoy, lies about 6 1/2 miles west-northwestward of Kersli Nina.

SAXSBY NINA is the wooded northwestern extremity of Vormsi. A light is shown from the point. Two lights, one shown about 1/2 mile southeastward and the other 300 yards southward of Saxsby Nina, aligned with Saxsby Nina Light, lead in the northwestern and southern approaches to Harikurk (sec. 10C-12).

Soolarahu, shoals with a least depth of 2 feet, lie about 1 1/4 miles westward of the southwestern end of Vormsi. A lighted buoy and spar buoys mark the edges of the shoals.

RUMPU NINA is the southern extremity of Vormsi. Sviiby Pier, with a depth of 5 feet alongside, is located about 1 mile northwestward of Rumpu Nina. Beacons at the head of the pier lead in the fairway between buoyed shoals.

HARIKURK AND MUHU VAIN (Central Part)

10C-12 Harikurk is the principal channel into Muhu Vain from the northward. Harilaid (58°58' N., 23°06' E.), a barren island, lies 3 1/4 miles south-southwestward of Saxsby Nina (sec. 10C-11). A reef with a least depth of 2 feet, extends about 2 miles northward of the island. Buoys mark the eastern side of the reef. A light shown near the southern end of Harilaid, aligned with a lighted beacon close south-southeastward, lead in the southern approach to Harikurk. Several reefs, above water, extend about 3 miles

southward from a position 1 mile southward of Harilaid. Eeriku, an above-water rock, lies near the southern end of the reefs. A buoy, moored about 3/4 mile southeastward of Eeriku, marks the edge of the reefs. A lighted buoy is moored about 1 3/4 miles southeastward of Eeriku.

ROHUKULA (58°55' N., 23°27' E.), is a point on the mainland forming the eastern side of the central part of Mahu Vain. The coast southward of Rohukula is low, rocky, and fronted by islets and shoals extending about 5 miles offshore. Rukkirahu, a low islet, lies 2 1/4 miles westward of Rohukula. A light is shown from the islet. Puisu Nina, the northern entrance point of Matsalu Laht, is located about 8 3/4 miles southward of Rohukula. Matsalu Laht, entered between Puisu Nina and Pika Nina, about 3 miles southeastward, has depths of 10 feet decreasing to 3 feet near the head of the bay.

The western side of the central part of Muhu Vain contains numerous islets and shoals, best seen on the chart. A beacon stands on Kumaru Laid, an islet about 3 miles westward of Puisu Nina. Shoals, with a least depth of 1 fathom, lie 2 to 3 1/4 miles westward of Kumaru Laid near the eastern side of the main channel through Muhu Vain. A lighted buoy marks the western side of the shoals. Kumaru Riff, with depths of 1 to 2 fathoms, extends about 7 miles southward of Kumaru Laid to Muhu (sec. 10C-13).

MUHU

10C-13 Muhu, a partly wooded island, lies at the southern end of Muhu Vain, and is separated from Saaremaa (sec. 10A-10) by Valke Vain (sec. 10C-17). A church spire rising above the trees in the center of the island and a house standing on Seanina, the northern point of Muhu, are conspicuous. A light is shown from the point. Steep cliffs form the northern side of the island. Shoals, with depths of less than 3 fathoms, extend 3 1/2 miles offshore. Range beacons stand at Nommkula, about 3 miles southeastward of Seanina, and range lights are shown from beacons at Raugi (58°39' N., 23°19' E.). A lighted buoy, with a radar reflector, is moored 1 1/4 miles northward of Raugi.

Reefs, marked by buoys, extend 1 1/2 miles off the northeastern side of Muhu. A narrow channel, marked by buoys, leads between the northeastern side of Muhu and the southern end of Kumaru Riff (sec. 10C-12).

VIRTUSU VAIN separates the northern part of Muhu from the mainland, eastward. Kessulaid, a densely wooded islet, lies in the middle of Virtsu Vain. Above-water reefs extend 3 1/4 miles northward of the islet. A beacon stands on Papilaid, at the northern end of the reefs. Range lights are shown from towers standing on the western side of Kessulaid. Shoals with a least depth of 4 feet extend 2 miles southward of Kessulaid. A lighted whistle buoy marks the southern end of the shoals.

VIRTUSU (58°34' N., 23°31' E.), a peninsula on the eastern side of Viire Kirk (sec. 10C-1), about 8 3/4 miles southward of Pika Nina (sec. 8C-12), is fringed by rocks as far as 1 1/2 miles offshore. A light is shown from Virtsu. Viirelaid is a low islet lying on the outer edge of a reef extending 1 1/2 miles off the southeastern end of Muhu. A drying reef encircling the islet extends 2 miles southward. Buoys mark the sides of the reef. A light is shown from the eastern point of Viirelaid and a fog signal is sounded close northward of the light.

KUIVASTU, a harbor basin on the eastern side of Muhu, is formed by a stone pier with two elbows. Vessels with a draft of 14 1/2 feet can berth alongside the pier. Northerly and southerly winds raise a rough sea. A light is shown from the pierhead, and a ferry plies between the harbor and Virtsu. Submarine cables are laid between Kuivastu and the northwestern end of Virtsu.

VIRTUSU HARBOR is located on the northwestern side of the peninsula. An elbow pier extending offshore about 350 yards forms the harbor. There are depths of 13 1/2 to 16 1/2 feet alongside the pier. A light is shown from the pierhead and a ferry service is conducted from the pier to Kuivastu.

VOOSIKURK (Northern Approach)

10C-14 Osmussaar (59°18' N., 23°25' E.), an inhabited island in the northern approach to Voosikurk (sec. 10C-1), lies about 16 1/2

miles north-northeastward of Kersli Nina (sec. 10C-11). Osmussaar is described in H.O. Pub. 44.

Pilots are fishermen from Osmussaar who conduct vessels to local harbors and through Muhu Vain to Parnu.

POOSASPEA NEEM (59°14'N., 23°32'E.), is a low, densely wooded point on the mainland about 4 miles southeastward of Osmussaar. A village on a ridge near the point, with several windmills nearby, is conspicuous. A light is shown from the point. Reefs extending about 1/2 mile offshore lie between the point and Noarootsi, a peninsula about 9 miles southward. From Dirhami Neem, a steep, sandy point about 1 1/4 miles southwestward of Poosaspea, the coast is fronted by rocks and shoals with a depth of less than 1 fathom extending about 2 miles offshore. A church about 3 miles southeastward of Dirhami Neem is prominent. There is a pier with depths of 4 1/2 to 6 1/2 feet alongside located about 1/4 miles eastward of Dirhami Neem.

TELISNA NINA (59°05'N., 23°28'E.), the northwestern extremity of Noarootsi, is low and wooded. A reef, with a least depth of 2 feet, extends about 2 1/4 miles northward of the point. Noarootsi, at its northeastern end, is joined by a low isthmus to the mainland. The low northern shore of the peninsula is fronted by foul ground extending about 1 mile offshore. Range beacons, standing on the coast about 1/2 mile southward of Telisna Nina, lead between offlying shoals, best seen on the chart.

RAMSI, a point on Noarootsi about 3 miles south-southwestward of Telisna Nina, forms the northeastern entrance of Vormsi (sec. 10C-11).

FAARVATER VOOSIKURK, the narrow fairway of the channel leading through Voosikurk, has a least depth of 10 1/4 feet (1964). The channel, marked by range lights, beacons and buoys, best seen on the chart, leads between shoals extending offshore from Vormsi and Noarootsi. A continuation of this channel, marked by lighted buoys, with a least depth of 12 1/4 feet, leads northward of Rukkirahu (sec. 10C-12), and joins the main channel through Muhu Vain (sec. 10C-12) southward of Vormsi. The range light structures standing on the northeastern part of

Vormsi are conspicuous. Hobulaid (58°57'N., 23°24'E.) is an island lying about 1 1/4 miles southward of the southeastern extremity of Vormsi. Range lights are shown from Hobulaid. A lighted fairway buoy is moored about 3/4 miles northeastward of the southern end of the island.

Currents, varying in direction and strength according to the prevailing winds and water level in the Gulfs of Finland and Riga, flows through Faarvater Voosikurk. The currents may attain a velocity of 4 knots and the water level falls as much as 1 1/2 feet below the mean with continuous easterly winds.

Spoil grounds and submarine cables in Voosikurk are shown on the chart.

HAAPSALU LAHT AND ROHUKULA HARBOR

10C-15 Pullapaa Nina (58°57'N., 23°29'E.), about 5 miles southward of Ramsi (sec. 10C-14), is the southern entrance point of Haapsalu Laht. The southern side of Noarootsi forms the northern entrance of Haapsalu Laht. Two disused beacons stand on Pullapaa Nina. The shores of Haapsalu Laht are low, marshy, and partly wooded. There are depths of 6 1/2 to 13 feet in the bay westward of Haapsalu Harbor; eastward of the harbor the bay is very shallow. Several villages and windmills are conspicuous. Rocky shoals front Haapsalu Laht, extending offshore to the approach channel from Faarvater Voosikurk. The channel, with a least depth of 10 3/4 feet (1964), marked by range lights, beacons and buoys, leads to Haapsalu Harbor.

Kajakarahu, a grassy islet, lies close westward of a peninsula extending north-northwestward from Haapsalu. A beacon on the islet and another close eastward lead to the harbor. A drying reef lies about 1/4 mile off the peninsula.

HAAPSALU HARBOR, on the southern shore of Haapsalu Laht, is formed by two land spits extending north-northwestward for about 1 mile from a peninsula. A wharf at the inner head of the western spit is available to vessels with a draft of 4 feet. Piers at the eastern spit have depths of 3 1/4 to 7 1/4 feet alongside. The town of Haapsalu is located on the root of the spits and adjacent mainland, about 2 1/2 miles eastward of Pullapaa Nina. Range lights, shown from the head of the western spit, lead to the harbor entrance.

ROHUKULA HARBOR (58°55' N., 23°27' E.), located on the mainland about 2 1/4 miles south-southwestward of Pullapaa Nina, is formed by moles and divided into two basins by a central mole. The northern basin, entered between the central molehead and an elbow of the northern mole, is available to vessels with a draft of 11 1/2 feet. Three piers extend into the basin from the central mole. The northern basin, entered between the southern and central moleheads, is available to vessels with a draft of 12 1/2 feet. Several piers extend into the basin. Buoys mark the ruins of a detached breakwater, shoals, a reef and sunken piles, all lying off the harbor entrance. Range lights lead into the harbor. Lights are shown from the detached breakwater and from the central molehead.

SOELA VAIN AND KASSAARE LAHT

10C-16 Soela Vain, lying between the islands of Saaremaa and Hiiumaa, leads into the western part of Kassaare Laht. The sound is encumbered with numerous rocks, wrecks, shoals and islets, best seen on the chart. Rocky shoals in the western entrance of Soela Vain are described in sections 10A-12 and 10A-13.

The channel through the northern part of Soela Vain, marked by buoys, can be entered by vessels with a draft of 10 feet when proceeding to Muhu Vain (sec. 10C-12). Range lights shown at Emmaste (58°41' N., 22°33' E.), lead in the western approach to the channel. A lighted buoy, with a radar reflector, is moored on the range alinement about 2 3/4 miles west-southwestward of Tohvri Nina (sec. 10A-13). Range lights at Soru, about 1/2 mile from Tohvri Nina, lead southeastward in the narrow part of the channel through Soela Vain.

The current is weak in Soela Vain during calm weather. Fresh northerly or southerly winds create a strong westerly current. An easterly current of about 4 knots is caused by strong southwesterly and northwesterly winds.

A long T-head pier, with a depth of about 6 1/2 feet alongside its head, extends offshore near Soru. The church at Emmaste is conspicuous. A submarine cable is laid from Emmaste, southward to the opposite shore.

KASSAARE LAHT, with general depths of about 4 fathoms, opens eastward into the central part of Muhu Vain (sec. 10C-12). The shores adjacent to the bay are fronted by rocky shoals of less than 3 fathoms extending as much as 3 miles offshore. The fairway to Muhu Vain lies about 3/4 mile northward of Seanina (sec. 10C-13).

The northern shore of Kassaare Laht is low and densely wooded. Kassaar, lying about 1 mile offshore, is a low island connected to the shore by a narrow neck of land. There are several villages and a prominent church spire on Kassaar.

ORJAKU (58°47' N., 22°47' E.), a fishing harbor on the western side of Kassaar, about 2 miles from the southern end of the island, is formed by a mole and detached breakwater. There are depths of 10 to 13 feet alongside the molehead. The entrance channel and harbor have a depth of 10 feet. Two piers, one of which has 10 feet at its head, extend off the northeastern side of the harbor. Range lights, shown on the mole, lead through a buoyed approach channel to the entrance. Range beacons on the molehead lead into the harbor.

The shore of Kassaare Laht, northward and eastward of Kassaar, is low and partly wooded. Salinomme, a peninsula about 2 miles northeastward of Kassaar, contains several prominent buildings. A church (sec. 10C-10), standing 3 miles northward of Salinomme is conspicuous. Ahelaid (58°45' N., 23°08' E.), the southernmost of several islands extending about 8 miles southeastward from Salinomme, lies about 3 miles northward of the fairway leading from Soela Vain.

The southern shore of Kassaare Laht from Pammana Nina (sec. 10A-12) to densely wooded Tinuri Nina, about 8 miles eastward, forms a bight fronted by rocky shoals extending as far as 1 mile offshore. A buoy, moored 2 miles eastward of Pammana, marks the eastern limit of the shoal. The shores of the bay are low and wooded. Triigi Nina is a salient feature about 4 1/2 miles southeastward of Pammana Nina.

TRIIGI HARBOR, about 1 mile southeastward of Triigi Nina, has a pier about 400 feet in length with depths of 9 to 14 feet at the pierhead and 13 feet off the pier. The approach channel has a least depth of 11 1/2

feet. Two buoys mark 1 fathom shoals close to the pierhead. A light shown from the pierhead, and a beacon nearby, alined with the light, lead through the approach fairway.

The coast for about 5 miles eastward from Tinuri Nina is low, backed in places by wooded ridges. Jaani Light is shown from a tower about 2 1/4 miles eastward of Tinuri Nina. A church about 1 1/2 miles southeastward of the light is conspicuous. Koinastu Laid, a low island with a steep northwestern side, lies about 4 1/2 miles eastward of Jaani Light and at the northern entrance of Vaike Vain. The southeastern side of the island is connected to Muhu (sec. 10C-13) by drying rocks. A beacon stands on the northern end of the island. Shoals with depths of less than 3 fathoms extend northeastward from Koinastu Laid across the fairway leading to Muhu Vain (sec. 10C-12). Vainakari, with a depth of 2 feet marked close southward by a buoy, lies 4 miles northward of the island. Viinakari, with a depth of 4 feet marked close southward by a lighted buoy, lies near the fairway and about 6 miles northeastward of Koinastu Laid.

VAIKE VAIN

10C-17 Vaike Vain, a shallow strait, separates the northeastern side of Saaremaa from Muhu (sec. 10C-13). The strait, extending southeastward from Kassaare Laht (sec. 10C-16), is entirely obstructed by a causeway on which a road has been constructed connecting Saaremaa and Muhu. Vaike Vain has depths of 3 to 15 feet. The shores of the strait are high and wooded northwestward and low and marshy southeastward of the causeway.

Orissaare Harbor (58°34'N., 23°06'E.), on Saaremaa and about 1 1/4 miles northwestward of the causeway, has a pier with 6 1/2 to 9 feet alongside. A beacon stands on the pier. Range beacons, about 3/4 mile southward of the pierhead, lead through an approach channel with a least depth of 8 1/2 feet.

The southeastern part of Vaike Vain contains rocky shoals, with islets lying close-off Muhu and reefs fronting the shore as far as Kubassaar (sec. 10B-31).

ANCHORAGES

10C-18 LEHTMA NINA.—Anchorage can be taken in 3 1/2 fathoms, sand, about 1 mile eastward of Lehtma Beacon.

KARDLA.—Anchorage, open to northeasterly winds and sea, can be taken in 4 1/2 to

6 fathoms, sand and mud, about 3 1/2 and 3 miles respectively, northward of Kardla range beacons. Sheltered anchorage can be taken in 2 to 2 3/4 fathoms about 1/2 mile northward of the beacons.

SUURSADAM.—Sheltered anchorage can be taken in 5 to 5 1/2 fathoms, sand and mud, about 2 miles northeastward of Hilesaare Nina. Small vessels can obtain sheltered anchorage in 3 1/2 fathoms, mud, about 3/4 mile westward of Saare Nina.

HELTERMAA.—Anchorage can be taken in 3 1/4 fathoms, mud, about 3 miles east-northeastward of Heltermaa.

RALBY LAHT.—Anchorage can be taken in the bay by vessels with a draft of 10 feet.

HARILAIID.—Anchorage, sheltered from northerly winds, can be taken in 4 to 5 fathoms mud and sand, about 3/4 mile south-southeastward of Harilaid.

RUKKIRAHU.—Anchorage can be taken in 3 1/4 fathoms, mud, about 2 3/4 miles westward of Rukkirahu.

VIIRE KURK.—Anchorage can be taken in 6 1/2 fathoms, mud, about 2 miles north-westward of Virtsu Lighthouse.

KUIVASTU.—Anchorage can be taken in 3 1/4 fathoms, mud, about 1/2 mile north-eastward of the pierhead in the harbor.

VIRTSU HARBOR.—Sheltered anchorage can be taken in 2 3/4 fathoms, mud, about 1/2 mile northwestward of the pierhead.

VOOSIKURK.—Sheltered anchorage can be taken with good holding ground, clear of the fairway.

HAAPSALU.—Anchorage can be taken in about 2 fathoms, off the harbor entrance.

ROHUKULA.—Sheltered anchorage can be taken as draft permits, outside the harbor.

SOELA VAIN.—Sheltered anchorage can be taken in 4 fathoms, clay and mud, about 1/2 mile southeastward of Soru jetty and in 2 1/2 fathoms close-off the jetty.

SOELA.—Sheltered anchorage can be taken in 2 fathoms about 1 1/2 miles off Soela (58°37'N., 22°36'E.).

TRIIGI.—Anchorage can be taken in 2 1/2 fathoms, open to northerly winds, about 1/4 mile off the pierhead.

VAIKE VAIN.—Anchorage can be taken in 3 fathoms, mud, about 1/4 mile off a pierhead located 2 miles east-southeastward of Jaami Church (sec. 10C-16). Anchorage can also be taken in 1 1/2 fathoms, mud, about 1/2 mile northward of Orissaare pier.

APPENDIX

CLIMATOLOGICAL TABLES

U. S. Weather Bureau

HAMMERSHUS, BORNHOLM.—Latitude 55°17' N., longitude 14°47' E., elevation 50 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1015	1014	1012	1013	1015	1014	1013	1012	1015	1014	1014	1012	1014	50
TEMPERATURE														
Average (°F.).....	33	32	35	40	49	56	61	61	56	49	41	36	46	40
Average daily maximum (°F.).....	36	35	38	45	55	63	67	66	60	52	44	39	50	40
Average daily minimum (°F.).....	30	29	31	36	43	51	57	56	52	45	38	33	42	40
Extreme highest each month (°F.).....	49	50	63	71	81	87	83	86	81	74	59	49	87	45
Extreme lowest each month (°F.).....	10	8	6	22	29	38	45	48	38	25	19	13	6	52
RELATIVE HUMIDITY														
Average percent (0800).....	88	88	87	84	80	82	83	84	85	85	85	87	85	30
Average percent (1400).....	86	84	81	77	72	73	74	76	77	79	82	86	79	30
CLOUD COVER														
Average amount (tenths).....	7.8	7.5	6.9	5.8	4.8	5.0	4.4	5.4	5.7	6.9	7.6	8.2	6.4	30
PRECIPITATION														
Average amount (inches).....	1.6	1.3	1.5	1.5	1.4	1.4	2.0	2.5	2.1	2.2	2.0	2.1	21.7	40
Maximum in 24 hours (inches).....	0.8	1.0	0.7	1.7	1.1	1.7	2.7	2.0	1.9	1.7	1.3	1.0	2.7	30
0.04 inch or more (mean number of days).....	10	7	8	8	7	7	8	11	9	10	12	12	109	40
Mean number of days with snow (Equal to 0.004 inch or more).....	8	7	8	2	0.1	0	0	0	0	0.2	2	6	33.3	40
WIND														
Direction (percentage of 0800 obs.):														
North.....	6	6	4	5	5	4	4	5	6	6	4	6	5	20
Northeast.....	7	8	8	10	7	6	6	5	8	9	8	7	7	20
East.....	7	10	13	13	16	10	12	8	7	7	7	8	10	20
Southeast.....	15	14	14	17	14	10	10	9	8	11	11	12	12	20
South.....	10	8	8	6	5	4	3	7	7	10	10	10	7	20
Southwest.....	21	20	21	20	26	21	19	20	21	21	23	24	21	20
West.....	19	17	17	15	15	28	29	26	21	15	17	17	20	20
Northwest.....	7	7	7	7	5	10	11	14	13	12	11	10	10	20
Calm.....	7	10	8	7	7	7	6	6	9	9	9	6	8	20
Mean wind force (Beaufort).....	3.2	2.8	2.7	2.5	2.1	2.5	2.4	2.4	2.8	2.9	3.2	3.3	2.7	20
Direction (percentage of 1400 obs.):														
North.....	6	5	3	4	2	1	2	3	5	6	5	6	4	20
Northeast.....	7	9	8	6	5	5	5	7	8	7	7	7	7	20
East.....	7	11	16	19	19	14	14	10	10	10	7	7	12	20
Southeast.....	14	13	15	15	18	11	10	9	8	11	12	11	12	20
South.....	11	8	6	5	4	3	3	4	6	7	10	10	6	20
Southwest.....	22	22	26	26	30	32	29	30	26	24	24	26	27	20
West.....	19	19	19	17	17	27	28	28	27	18	19	18	21	20
Northwest.....	8	7	5	4	2	4	5	7	8	9	11	9	7	20
Calm.....	6	6	2	4	3	3	4	4	3	7	5	6	4	20
Mean wind force (Beaufort).....	3.2	2.9	2.8	2.6	2.3	2.7	2.5	2.7	2.9	3.0	3.2	3.2	2.8	20
41 knots or over (mean number of days).....	1	0.4	0.2	0.1	0	0	0.1	0.3	0.4	0.9	1	1	5.6	30
VISIBILITY														
Days with fog.....	0	0	0	0	5	2	2	0.9	2	3	2	3	43.9	40

Ø Less than 0.1.

KALMAR, SWEDEN.—Latitude 56°40' N., longitude 16°22' E., elevation 34 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1015	1014	1013	1013	1015	1014	1012	1012	1014	1014	1013	1012	1013	60
TEMPERATURE														
Average (°F.).....	30	30	33	40	49	58	62	61	55	46	38	32	44	62
Average daily maximum (°F.).....	35	35	39	47	57	66	71	68	61	51	42	37	51	39-40
Average daily minimum (°F.).....	25	24	27	34	41	50	55	53	47	41	33	28	38	39-40
Extreme highest each month (°F.).....	57	54	67	77	91	91	92	91	83	72	56	54	92	50
Extreme lowest each month (°F.).....	-9	-6	-5	13	22	34	37	34	27	19	1	0	-9	50
RELATIVE HUMIDITY														
Average percent (0800).....	89	87	86	82	77	74	77	82	86	88	89	89	84	20
Average percent (1400).....	85	80	75	73	70	67	69	70	73	76	83	86	76	20
CLOUD COVER														
Average amount (tenths).....	7.4	7.4	6.7	5.8	5.3	4.8	5.6	5.2	5.3	6.7	7.5	7.9	6.3	20
Mean number of days clear.....	3	3	6	5	7	6	7	6	5	4	2	2	56	20
Mean number of days cloudy.....	19	16	13	12	9	8	9	8	8	14	18	21	155	20
PRECIPITATION														
Average amount (inches).....	0.94	0.79	0.94	1.06	1.14	1.38	1.81	2.01	1.54	1.50	1.42	1.22	15.75	61
Greatest amount (inches).....	2.36	3.31	3.98	3.27	3.15	4.41	5.16	4.92	5.51	3.62	4.06	2.72	24.06	51
Least amount (inches).....	0.12	0.04	0.08	0.00	0.20	0.20	0.08	0.00	0.24	0.00	0.04	0.00	7.56	51
Maximum in 24 hours (inches).....	0.91	0.79	0.63	0.98	1.18	1.22	2.76	1.93	1.34	1.57	1.38	0.91	2.76	61
0.04 inches or more (mean number of days).....	8	7	6	8	6	7	8	9	8	9	8	9	93	20
Mean number of days with snow (Equal to 0.004 inches or more).....	8	9	9	3	1	0	0	0	0	1	3	7	41	38
WIND														
Direction (percentage of 0800 obs.):														
North.....	11	16	12	12	8	6	5	9	15	12	13	14	11	10
Northeast.....	8	13	12	25	20	16	22	10	9	6	10	9	13	10
East.....	11	12	9	12	7	6	6	7	9	4	7	6	8	10
Southeast.....	7	6	5	4	4	4	3	7	6	6	9	8	6	10
South.....	10	7	5	5	11	8	5	7	7	8	7	10	8	10
Southwest.....	23	16	19	16	22	23	19	17	17	21	18	23	19	10
West.....	13	10	12	11	13	21	22	24	21	21	17	15	17	10
Northwest.....	10	7	10	7	6	11	12	13	12	16	13	10	11	10
Calm.....	7	13	16	8	9	5	6	6	4	6	6	5	7	10
Mean speed (knots).....	8.4	7.1	9.7	8.4	9.0	9.7	8.4	7.7	10.3	9.7	9.7	9.0	8.9	7
Direction (percentage of 1400 obs.):														
North.....	9	11	6	10	3	4	3	4	6	10	11	15	8	10
Northeast.....	9	16	19	23	19	14	17	10	15	8	11	8	14	10
East.....	10	14	10	13	10	8	6	12	8	6	8	7	9	10
Southeast.....	9	5	4	5	7	5	3	9	5	6	6	7	6	10
South.....	11	9	11	14	21	19	15	17	16	14	11	10	14	10
Southwest.....	25	17	23	17	24	28	25	21	23	22	21	23	22	10
West.....	13	11	14	10	9	14	19	18	17	20	16	14	15	10
Northwest.....	8	7	7	4	4	7	7	8	8	11	13	10	8	10
Calm.....	6	10	6	4	3	1	5	1	2	3	3	6	4	10
Mean speed (knots).....	9.7	9.7	11.6	12.3	12.9	13.2	13.2	12.3	14.2	11.6	11.0	11.0	12.0	7
34 knots or over (mean number of days).....	3	2	2	3	2	2	2	3	2	3	3	3	30	30
VISIBILITY														
Days with fog.....	5	6	6	4	2	1	1	1	4	7	6	7	50	30

KLAIPEDA, LITHUANIA.—Latitude 55°43' N., longitude 21°08' E., elevation 13 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE*														
Average (millibars).....	1016	1014	1012	1014	1015	1013	1011	1012	1015	1015	1014	1014	1014	35
TEMPERATURE														
Average (°F.).....	27	27	32	41	51	59	63	62	55	46	37	30	44	80
Average daily maximum (°F.).....	31	32	37	49	60	66	70	68	61	51	41	34	50	50
Average daily minimum (°F.).....	23	23	27	35	44	51	56	55	49	41	33	26	39	50
Extreme highest each month (°F.).....	44	48	62	80	86	93	93	94	81	72	58	49	94	55
Extreme lowest each month (°F.).....	-18	-23	-12	13	21	34	39	34	28	9	0	-13	-23	55
RELATIVE HUMIDITY*														
Average percent (0800).....	88	88	87	81	72	73	76	80	83	87	87	90	82	25
Average percent (1400).....	86	85	79	70	62	65	67	69	70	77	84	88	75	25
CLOUD COVER														
Average amount (tenths).....	8.0	7.6	7.1	6.3	5.5	5.6	5.8	6.2	6.2	7.3	8.2	8.4	6.8	50
Mean number of days clear.....	2	2	3	4	5	4	4	3	3	2	1	1	34	50
Mean number of days cloudy.....	19	16	15	11	7	7	7	8	8	14	18	22	152	50
PRECIPITATION														
Average amount (inches).....	2.09	1.54	1.46	1.54	1.73	1.97	2.52	3.50	2.95	3.07	2.80	2.80	27.97	40
Greatest amount (inches).....	5.28	3.35	2.99	3.74	5.51	4.21	5.00	6.69	5.79	8.19	5.35	5.91	35.71	40
Least amount (inches).....	0.47	0.71	0.16	0.12	0.43	0.35	0.75	0.75	0.94	0.59	0.31	0.39	18.94	40
Maximum in 24 hours (inches).....	0.79	0.59	0.94	0.94	1.30	2.28	2.01	2.28	1.69	1.85	1.06	0.94	2.28	35
0.04 inch or more (mean number of days).....	16	14	14	11	11	11	12	15	14	16	18	18	170	40
Mean number of days with snow.....	11	10	8	3	0	0	0	0	0	1	4	9	46	40
WIND*														
Direction (percentage of 0800 obs.):														
North.....	7	6	6	8	7	8	10	7	7	4	6	5	7	20
Northeast.....	7	7	14	13	14	10	12	9	11	9	10	6	10	20
East.....	9	9	15	13	14	10	10	6	12	15	10	10	11	20
Southeast.....	21	25	24	18	16	13	10	16	19	30	24	29	20	20
South.....	18	17	13	12	13	11	10	9	11	11	14	16	13	20
Southwest.....	12	11	9	13	13	15	13	13	10	9	13	12	12	20
West.....	12	13	9	12	10	17	20	21	15	10	14	12	14	20
Northwest.....	13	10	8	10	12	15	13	16	12	11	7	9	11	20
Calm.....	1	2	2	1	1	1	2	3	3	1	2	1	2	20
Mean speed (knots).....	8	7	7	7	6	8	7	8	8	9	9	9	8	10
Direction (percentage of 1400 obs.):														
North.....	6	5	7	7	8	9	10	7	8	7	6	5	7	20
Northeast.....	7	6	8	6	7	5	4	6	5	8	7	6	6	20
East.....	9	9	13	8	7	3	4	4	7	10	9	10	8	20
Southeast.....	19	19	17	11	8	6	4	7	10	20	22	23	14	20
South.....	18	19	14	13	8	7	5	7	11	19	16	18	13	20
Southwest.....	13	14	13	18	15	16	15	17	17	13	15	14	15	20
West.....	13	14	13	17	21	25	30	29	22	14	14	13	19	20
Northwest.....	14	12	14	19	26	29	27	25	18	12	9	9	18	20
Calm.....	1	2	1	1	0	0	0	0	1	0	1	1	0	20
Mean speed (knots).....	9	8	9	9	8	10	9	10	10	11	10	9	9	10
34 knots or over (mean number of days).....	4	3	2	0.7	0.7	0.4	1	3	2	4	5	5	30.8	35
VISIBILITY														
Days with visibility less than 1 mile.....	5	5	5	3	3	2	1	1	2	3	5	5	40	35

* Elev. 31 ft.

Ø Less than 0.5.

NOWY PORT—GDANSK, POLAND.—Latitude 54°24' N., longitude 18°40' E., elevation 36 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1015	1014	1012	1013	1015	1013	1012	1012	1015	1014	1015	1013	1014	36
TEMPERATURE														
Average (°F.).....	29	31	35	43	52	59	63	62	57	48	39	33	46	36
Average daily maximum (°F.).....	33	35	40	49	59	66	70	69	63	53	43	36	51	36
Average daily minimum (°F.).....	25	26	30	37	45	52	56	55	50	42	34	29	41	36
Extreme highest each month (°F.).....	51	56	70	78	90	92	94	91	85	77	62	54	94	44
Extreme lowest each month (°F.).....	-9	-9	-7	18	27	34	41	41	29	16	4	-16	-16	44
RELATIVE HUMIDITY														
Average percent (0800).....	86	86	82	78	70	70	74	77	81	85	87	87	80	20
Average percent (1400).....	82	79	71	66	62	63	65	66	67	73	82	84	72	20
CLOUD COVER														
Average amount (tenths).....	7.5	7.4	7.1	6.4	5.7	5.6	5.9	6.0	5.7	6.8	7.6	8.0	6.6	35
Mean number of days clear.....	3	2	3	4	6	5	4	3	4	3	2	1	40	49
Mean number of days cloudy.....	17	15	15	11	8	8	8	8	8	13	16	19	146	49
PRECIPITATION														
Average amount (inches).....	1.2	1.0	1.3	1.5	1.8	2.3	2.8	2.0	2.1	1.8	1.8	1.5	21.7	35
Greatest amount (inches)*.....	2.76	2.44	3.46	2.76	5.43	4.76	5.91	6.18	7.68	3.94	5.79	3.66	30.98	40
Least amount (inches)*.....	0.35	0.20	0.12	0.28	0.12	0.12	0.24	0.39	0.39	0.08	0.16	0.39	14.69	40
Maximum in 24 hours (inches).....	0.7	1.0	1.2	1.3	1.6	1.7	1.9	2.7	2.6	1.1	1.8	0.8	2.7	35
0.04 inch or more (mean number of days).....	8	7	7	8	8	9	10	9	10	9	9	9	103	30
Mean number of days with snow*.....	9	8	7	3	Ø	0	0	0	0	Ø	3	7	37	40
WIND														
Direction (percentage of 0800 obs.):														
North.....	5	5	8	16	22	21	18	10	6	4	3	4	10	18-19
Northeast.....	3	2	8	9	9	6	7	2	5	3	4	4	5	18-19
East.....	3	5	8	7	8	8	5	3	6	8	3	4	6	18-19
Southeast.....	14	13	17	10	7	6	7	10	19	15	15	15	12	18-19
South.....	26	26	21	14	14	13	9	16	18	26	26	30	20	18-19
Southwest.....	17	17	11	11	8	11	13	18	17	14	21	18	15	18-19
West.....	18	17	13	14	13	15	15	23	15	12	16	13	15	18-19
Northwest.....	11	10	6	12	12	14	20	14	12	6	8	6	11	18-19
Calm.....	3	5	8	7	7	6	7	11	8	4	6	6	6	18-19
Mean wind force (Beaufort).....	3.1	2.9	2.7	2.8	2.7	2.7	2.6	2.5	2.5	2.5	3.0	2.9	2.7	18-19
Direction (percentage of 1400 obs.):														
North.....	5	7	12	20	28	26	25	16	14	7	7	4	14	18-19
Northeast.....	4	4	12	20	24	22	20	13	15	6	4	4	12	18-19
East.....	4	6	12	12	12	13	11	11	12	5	4	4	10	18-19
Southeast.....	12	13	13	5	4	5	2	4	8	18	12	15	9	18-19
South.....	22	23	18	11	8	6	5	10	13	20	24	28	16	18-19
Southwest.....	18	16	11	10	6	8	10	12	13	16	20	18	13	18-19
West.....	19	16	12	13	9	10	14	21	14	12	15	14	14	18-19
Northwest.....	12	11	6	8	8	9	11	12	10	6	9	7	9	18-19
Calm.....	4	4	4	1	1	1	2	1	2	3	4	6	3	18-19
Mean wind force (Beaufort).....	3.3	3.2	3.3	3.6	3.4	3.3	3.2	3.2	3.3	3.0	3.2	2.9	3.2	18-19
34 knots or over (mean number of days).....	5	4	3	3	2	1	2	1	2	3	2	3	31	30
VISIBILITY														
Days with fog.....	2	2	3	2	2	1	0.3	0.6	1	3	4	4	24.9	36

* Lat. 54°23' N.
Long. 18°36' E.
Elev. 49 ft.

Ø Less than 0.5.

RIGA, LATVIA.—Latitude 56°57' N., longitude 24°06' E., elevation 67 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1015	1015	1014	1013	1016	1012	1011	1011	1015	1016	1013	1013	1014	30
TEMPERATURE														
Average (°F.).....	23	24	29	41	52	60	65	63	55	44	34	26	43	90-93
Average daily maximum (°F.).....	29	29	36	48	60	67	72	68	61	49	39	31	49	30
Average daily minimum (°F.).....	20	20	26	35	44	51	56	54	47	39	31	24	37	30
Extreme highest each month (°F.).....	45	49	62	75	86	90	93	90	81	68	56	50	93	24-30
Extreme lowest each month (°F.).....	-20	-18	-10	17	27	35	44	42	29	15	-5	-11	-20	24-30
RELATIVE HUMIDITY														
Average percent (0700).....	90	90	88	82	73	72	77	84	89	91	91	91	85	52
Average percent (1300).....	86	84	74	64	56	58	61	65	68	77	85	88	72	52
CLOUD COVER*														
Average amount (tenths).....	7.7	7.2	6.6	5.8	5.5	5.0	5.4	5.7	5.8	7.1	8.2	8.0	6.5	37-38
Equal to or less than 2/10 average amount (mean number of days).....	2	2	5	5	6	6	6	4	4	3	1	2	46	36
Equal to or more than 8/10 average amount (mean number of days).....	20	16	14	12	9	8	8	9	9	15	19	20	159	36
PRECIPITATION														
Average amount (inches).....	1.30	1.02	1.06	1.22	1.69	2.36	2.99	2.95	2.13	2.01	1.93	1.46	22.12	57-59
Greatest amount (inches)*.....	3.12	2.77	2.57	2.86	3.79	6.66	6.65	6.98	4.86	5.15	5.57	3.94	34.83	39
Least amount (inches)*.....	0.46	0.17	0.17	0.43	0.35	0.39	0.61	0.68	0.61	0.45	0.75	0.21	17.80	39
Maximum in 24 hours (inches)*.....	0.61	0.73	0.68	1.17	1.35	1.72	2.41	1.96	1.51	1.20	1.20	0.63	2.41	39
0.04 inch or more (mean number of days).....	9	8	8	8	10	10	9	12	12	14	12	10	122	15
Mean number of days with snow*.....	14	12	11	4	1	Ø	0	0	0	2	7	12	64	36
WIND														
Direction (percentage of 0700 obs.):														
North.....	2	13	7	12	14	14	9	12	9	6	3	5	9	8
Northeast.....	6	7	8	8	12	7	6	14	9	7	7	8	8	8
East.....	12	10	12	11	10	9	8	10	6	8	10	12	10	8
Southeast.....	20	17	14	23	11	10	17	10	13	16	27	23	17	8
South.....	27	17	17	12	10	12	12	17	18	22	29	23	18	8
Southwest.....	18	15	19	13	13	18	17	17	23	26	17	17	18	8
West.....	11	10	12	9	12	12	14	10	15	9	4	9	10	8
Northwest.....	4	11	11	12	18	18	17	10	7	6	3	3	10	8
Calm.....	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Mean wind force (Beaufort).....	3.2	3.0	2.9	2.7	2.7	2.9	2.6	2.6	2.5	3.0	2.9	3.1	2.8	10
Direction (percentage of 1300 obs.):														
North.....	3	13	12	17	30	24	20	26	15	6	3	5	14	8
Northeast.....	3	4	5	6	6	6	5	10	4	8	6	11	6	8
East.....	10	8	9	6	9	6	4	9	6	8	6	11	8	8
Southeast.....	22	16	14	14	9	5	10	6	11	13	25	21	14	8
South.....	24	16	14	13	7	9	10	11	15	20	29	22	16	8
Southwest.....	22	14	19	14	9	12	15	8	17	23	16	14	15	8
West.....	10	9	10	8	9	14	13	11	14	12	9	10	11	8
Northwest.....	6	20	17	22	21	24	23	19	18	10	6	6	16	8
Calm.....	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Mean wind force (Beaufort).....	3.3	3.3	3.5	3.5	3.5	3.7	3.5	3.4	3.5	3.5	3.1	3.1	3.4	10
34 knots or over (mean number of days).....	3	2	3	2	2	1	1	2	2	2	3	3	26	30
VISIBILITY														
Days with fog.....	6	7	8	6	2	1	2	4	7	11	8	9	71	30

* Lat. 56°59' N.
Long. 24°05' E.
Elev. 7 ft.

Ø Less than 0.5.

STOCKHOLM, SWEDEN.—Latitude 59°20' N., longitude 18°05' E., elevation 146 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1013	1012	1012	1013	1015	1013	1011	1011	1013	1013	1012	1011	1012	60
TEMPERATURE														
Average (°F.).....	27	26	30	38	48	57	62	59	53	43	35	29	43	62
Average daily maximum (°F.).....	31	32	36	46	57	67	71	67	59	48	39	33	49	48
Average daily minimum (°F.).....	22	21	24	31	40	49	54	52	46	38	31	24	30	48
Extreme highest each month (°F.).....	51	54	59	77	84	91	97	91	84	68	57	52	97	175
Extreme lowest each month (°F.).....	-26	-22	-14	-8	20	32	35	36	26	16	0	-9	-26	175
RELATIVE HUMIDITY														
Average percent (0800).....	85	82	80	77	67	66	71	79	85	88	88	87	80	20
Average percent (1400).....	82	75	67	62	54	55	59	64	68	76	84	86	69	20
CLOUD COVER														
Average amount (tenths).....	7.6	7.3	6.6	6.0	5.6	5.4	5.9	6.0	5.9	7.2	7.4	8.1	6.6	46
Mean number of days clear.....	2	3	7	4	7	7	6	5	5	3	2	2	53	10
Mean number of days cloudy.....	22	17	13	12	11	9	10	10	11	17	20	21	173	10
PRECIPITATION														
Average amount (inches).....	1.46	1.22	1.38	1.38	1.46	1.69	2.56	2.95	1.89	1.85	1.85	1.93	21.62	61
Greatest amount (inches).....	3.07	3.35	3.90	3.03	3.54	3.78	5.08	7.28	5.91	5.67	6.85	3.90	28.47	85
Maximum in 24 hours (inches).....	0.71	0.83	0.83	1.46	1.81	1.26	2.64	2.68	1.65	1.42	1.57	1.14	2.68	61
0.04 inch or more (mean number of days).....	8	7	7	6	8	7	9	10	8	9	9	9	97	38
Mean number of days with snow (Equal to 0.004 inches or more).....	12	11	11	5	2	Ø	0	0	Ø	2	6	11	60	38
WIND														
Direction (percentage of 0800 obs.):														
North.....	8	11	13	15	12	13	13	10	13	9	8	10	11	10
Northeast.....	9	12	10	17	10	9	10	8	9	5	7	7	10	10
East.....	7	9	6	10	9	7	11	6	6	5	6	5	7	10
Southeast.....	9	9	6	12	11	11	9	12	7	7	9	11	10	10
South.....	16	9	8	7	14	9	7	10	10	10	11	13	10	10
Southwest.....	20	17	16	13	15	16	16	19	18	19	20	20	17	10
West.....	16	14	20	12	13	19	17	17	17	19	16	16	16	10
Northwest.....	7	10	14	7	7	11	8	10	10	17	16	12	11	10
Calm.....	8	9	7	7	9	5	9	8	10	9	7	6	8	10
Mean wind force (Beaufort).....	2.4	2.3	2.1	2.2	2.3	2.4	2.1	2.2	2.1	2.3	2.1	2.2	2.2	10
Direction (percentage of 1400 obs.):														
North.....	6	13	12	13	7	11	9	9	12	12	10	9	10	10
Northeast.....	9	12	8	14	10	9	9	5	8	7	8	8	9	10
East.....	5	12	7	12	11	7	13	6	6	4	3	5	8	10
Southeast.....	10	9	9	15	17	11	13	13	9	7	8	9	11	10
South.....	19	10	10	9	17	16	9	15	13	16	13	14	13	10
Southwest.....	18	16	13	11	16	13	16	18	16	17	20	22	16	10
West.....	17	15	23	16	15	22	21	21	19	18	16	18	19	10
Northwest.....	9	10	13	8	5	9	6	11	11	15	14	8	10	10
Calm.....	7	3	5	2	2	2	4	2	6	4	8	7	4	10
Mean wind force (Beaufort).....	2.4	2.6	2.7	2.7	2.8	2.9	2.6	2.7	2.6	2.8	2.3	2.3	2.6	10
34 knots or over (mean number of days).....	0.4	0.5	0.4	0.2	0.2	0.2	0.1	0.2	0.2	0.4	0.2	0.3	3.3	48
VISIBILITY														
Days with fog.....	5	4	5	4	1	0	1	1	4	7	7	7	46	30

Ø Less than 0.5.

SWINOUJSCIE, POLAND.—Latitude 53°55' N., longitude 14°16' E., elevation 33 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1015	1014	1012	1012	1014	1013	1012	1012	1015	1014	1014	1012	1013	45
TEMPERATURE														
Average (°F.).....	32	33	37	44	53	60	64	63	57	49	40	34	47	45
Average daily maximum (°F.).....	35	37	42	50	60	67	71	69	63	53	43	37	52	45
Average daily minimum (°F.).....	28	29	32	38	45	53	57	56	51	44	36	31	42	45
*Extreme highest each month (°F.).....	50	58	70	74	89	89	94	89	86	73	63	53	94	35
*Extreme lowest each month (°F.).....	-21	-13	4	19	27	37	45	41	34	25	6	-7	-21	35
RELATIVE HUMIDITY														
Average percent (0800).....	88	88	85	80	74	72	75	79	83	87	89	91	83	21
Average percent (1400).....	85	80	73	67	63	64	65	66	68	76	82	88	73	21
CLOUD COVER														
Average amount (tenths).....	7.4	7.1	6.7	6.1	5.4	5.6	5.9	6.1	5.6	6.7	7.4	8.1	6.5	46
Mean number of days clear.....	2.5	2.3	3.0	4.0	5.4	4.2	2.9	2.4	4.3	2.1	1.6	1.1	35.8	46
Mean number of days cloudy.....	16.5	13.5	12.9	9.6	7.1	7.6	7.5	8.1	7.2	12.4	15.5	19.2	137.1	46
PRECIPITATION														
Average amount (inches).....	1.9	1.4	1.6	1.7	1.9	2.1	2.9	2.9	2.0	2.0	1.7	2.2	24.3	35
Least amount (inches).....	0.63	0.67	1.30	0.94	1.18	2.01	2.05	1.73	1.73	1.65	0.91	0.98	2.05	35
Maximum in 24 hours (inches).....	0.63	0.67	1.30	0.94	1.18	2.01	2.05	1.73	1.73	1.65	0.91	0.98	2.05	35
0.04 inch or more (mean number of days).....	12	9	9	10	9	10	10	12	9	9	10	12	121	24-25
Mean number of days with snow.....	9	8	6	2	0	0	0	0	0	1	4	7	37	40
WIND														
Direction (percentage of 0800 obs.):														
North.....	7	6	7	12	13	13	14	8	7	4	4	5	8	19
Northeast.....	5	4	8	10	15	11	9	4	6	5	4	2	7	19
East.....	7	10	11	9	10	5	5	4	5	10	9	7	8	19
Southeast.....	13	17	18	13	14	10	10	11	17	16	16	14	14	19
South.....	14	15	13	10	10	6	7	10	11	15	16	17	12	19
Southwest.....	19	15	14	15	13	14	14	18	19	16	20	20	16	19
West.....	22	17	15	16	14	23	25	29	26	20	19	20	20	19
Northwest.....	9	11	7	11	8	15	13	12	9	7	6	9	10	19
Calm.....	4	5	7	4	3	3	3	5	6	6	6	4	5	19
Mean wind force (Beaufort).....	3.2	2.8	2.8	2.8	2.6	2.7	2.5	2.7	2.6	2.6	2.8	3.0	2.8	25
Direction (percentage of 1400 obs.):														
North.....	8	10	13	21	24	23	21	17	14	8	6	5	14	19
Northeast.....	4	6	14	22	26	23	22	13	13	11	5	4	14	19
East.....	6	9	9	8	8	3	5	4	3	9	7	5	6	19
Southeast.....	13	14	16	7	8	5	4	6	8	17	17	17	11	19
South.....	12	12	10	7	6	3	5	7	9	11	17	15	9	19
Southwest.....	20	19	16	14	10	13	13	17	18	16	22	22	17	19
West.....	25	18	13	11	10	16	16	20	18	16	17	20	17	19
Northwest.....	10	11	8	10	8	13	13	15	15	10	7	9	11	19
Calm.....	2	1	1	0	0	1	1	1	2	2	2	3	1	19
Mean wind force (Beaufort).....	3.3	3.2	3.4	3.5	3.3	3.2	3.0	3.1	3.2	3.0	3.1	3.1	3.2	25
34 knots or over (mean number of days).....	3	2	3	1	1	0	0	1	1	2	3	3	20	41
VISIBILITY														
Days with fog.....	5	4	3	2	1	1	1	1	2	4	5	5	33	30

Ø Less than 0.5.

SZCZECIN, POLAND.—Latitude 53°26' N., longitude 14°34' E., elevation 66 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Year of record
SEA LEVEL PRESSURE														
Average (millibars).....	1013	1013	1010	1010	1012	1011	1011	1011	1013	1012	1013	1011	1012	4
TEMPERATURE														
Average (°F.).....	30	32	38	46	55	62	65	63	57	48	39	33	47	4
Average daily maximum (°F.).....	34	37	44	53	64	71	73	71	64	53	43	37	54	4
Average daily minimum (°F.).....	26	27	31	38	46	52	56	55	49	42	34	29	40	4
Extreme highest each month (°F.).....	54	56	70	81	90	92	97	93	90	75	64	55	97	4
Extreme lowest each month (°F.).....	-14	-9	3	19	27	39	45	37	32	22	6	-2	-14	4
RELATIVE HUMIDITY														
Average percent (0800).....	89	87	86	80	75	74	77	82	87	91	90	89	84	4
Average percent (1400).....	84	76	65	58	52	55	55	57	62	71	81	85	67	4
CLOUD COVER*														
Average amount (tenths).....	7.4	7.1	6.6	6.0	5.4	5.4	5.8	5.7	5.6	6.8	7.5	7.9	6.4	4
Equal to or less than 3/10 average amount (mean number of days).....	3	2	3	4	5	5	4	3	4	2	2	1	38	4
Equal to or more than 8/10 average amount (mean number of days).....	17	13	12	10	7	7	8	7	8	12	16	18	135	4
PRECIPITATION														
Average amount (inches).....	1.8	1.3	1.5	1.4	1.7	2.0	3.0	2.5	1.8	1.6	1.5	2.0	22.1	4
Greatest amount (inches)*.....	4.06	2.87	2.87	4.17	3.94	4.88	7.99	5.55	3.82	4.17	3.03	4.25	29.13	4
Least amount (inches)*.....	0.55	0.24	0.04	0.04	0.67	0.35	1.06	0.83	0.39	0.04	0.16	0.31	15.59	4
Maximum in 24 hours (inches).....	0.51	0.63	1.38	1.18	1.14	1.38	1.89	2.83	1.73	1.46	0.83	0.83	2.83	4
0.04 inch or more (mean number of days).....	10	8	9	9	8	9	10	10	8	8	8	11	108	4
Mean number of days with snow (Equal to 0.004 inches or more).....	8	7	5	2	Ø	0	0	0	0	Ø	3	7	33	4
WIND														
Direction (percentage of 0800 obs.):														
North.....	3	6	5	6	10	11	4	7	5	3	2	3	6	4
Northeast.....	3	8	8	6	13	7	5	10	6	3	4	6	7	4
East.....	13	11	10	15	12	7	8	9	9	8	15	13	11	4
Southeast.....	13	8	10	12	9	8	7	7	9	10	19	17	11	4
South.....	16	9	6	9	6	6	6	4	9	15	13	15	9	4
Southwest.....	28	26	24	19	15	22	26	26	30	34	29	25	25	4
West.....	14	21	17	16	16	23	30	21	18	16	10	11	18	4
Northwest.....	4	7	8	8	8	8	8	7	7	5	2	4	6	4
Calm.....	6	4	12	9	11	8	6	9	7	6	6	6	7	4
Mean wind force (Beaufort).....	2.3	2.1	1.9	2.3	1.8	2.0	2.0	1.9	1.8	2.1	2.3	2.0	2.0	4
Direction (percentage of 1400 obs.):														
North.....	4	9	14	15	23	23	21	18	14	6	3	6	13	4
Northeast.....	3	7	6	9	11	6	6	10	6	4	4	6	6	4
East.....	11	10	12	10	9	3	2	4	5	7	14	12	8	4
Southeast.....	15	9	14	13	10	9	8	8	14	10	18	16	12	4
South.....	16	7	6	8	9	6	7	7	10	13	15	15	10	4
Southwest.....	26	24	19	16	15	18	17	13	21	30	25	22	21	4
West.....	15	21	18	16	11	24	30	25	19	20	13	14	19	4
Northwest.....	5	11	10	10	9	11	7	12	10	8	4	5	9	4
Calm.....	5	2	1	3	3	0	2	3	1	2	4	4	2	4
Mean wind force (Beaufort).....	2.5	2.5	2.5	2.9	2.4	2.7	2.5	2.3	2.4	2.6	2.6	2.3	2.5	4
34 knots or over (mean number of days).....	2	2	2	2	1	0.9	0.9	1	1	1	2	2	17.8	4
VISIBILITY														
Days with fog.....	5	4	4	2	0.7	0.7	Ø	2	5	8	8	7	46.8	4

* Lat. 53°24' N.
Long. 14°38' E.
Elev. 3 ft.

Ø Less than 0.5.

VISBY, GOTLAND.—Latitude 57°38' N., longitude 18°17' E., elevation 36 feet

Weather elements	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Years of record
SEA LEVEL PRESSURE														
Average (millibars).....	1014	1013	1012	1013	1015	1013	1012	1011	1014	1014	1012	1011	1013	60
TEMPERATURE														
Average (°F.).....	31	31	32	39	47	56	61	60	54	46	39	33	44	62
Average daily maximum (°F.).....	35	34	37	45	55	64	68	66	59	50	42	37	49	40-42
Average daily minimum (°F.).....	27	26	27	33	40	48	54	54	48	40	34	29	38	41-42
Extreme highest each month (°F.).....	50	49	61	73	82	88	90	87	78	68	59	52	90	65
Extreme lowest each month (°F.).....	-13	-6	-6	5	26	32	42	41	30	19	10	8	-13	65
RELATIVE HUMIDITY														
Average percent (0800).....	85	82	82	79	72	72	76	78	82	83	84	84	80	20
Average percent (1400).....	83	79	75	71	65	66	71	71	73	77	81	84	75	20
CLOUD COVER														
Average amount (tenths).....	8.5	8.5	8.3	7.8	7.2	7.2	7.5	7.7	7.9	8.1	8.4	8.6	8.0	48
Mean number of days clear.....	3	2	7	7	10	9	9	7	7	4	1	1	67	20
Mean number of days cloudy.....	20	16	13	10	7	5	7	6	8	14	18	22	146	20
PRECIPITATION														
Average amount (inches).....	1.54	1.26	1.22	1.02	1.06	1.22	1.93	2.52	1.77	2.09	2.05	1.93	19.61	61
Greatest amount (inches).....	3.78	3.70	3.39	3.07	2.99	3.07	4.61	7.32	4.02	6.14	5.95	3.82	28.35	85
Maximum in 24 hours (inches).....	1.54	2.13	0.94	0.91	0.98	1.54	3.62	3.15	2.13	2.05	2.48	2.01	3.62	61
0.04 inch or more (mean number of days).....	10	8	8	6	6	6	7	9	8	10	11	11	100	38
WIND														
Direction (percentage of 0800 obs.):														
North.....	10	18	15	16	15	15	13	14	15	14	13	14	14	16
Northeast.....	8	14	10	11	10	7	8	5	8	7	8	7	9	16
East.....	8	12	8	12	9	6	5	6	7	5	6	6	7	16
Southeast.....	10	8	9	9	7	6	9	7	7	7	11	9	8	16
South.....	21	12	15	16	13	12	14	15	14	15	22	21	16	16
Southwest.....	24	17	20	18	24	26	24	24	20	25	19	21	22	16
West.....	10	9	11	8	11	18	17	16	14	12	10	12	12	16
Northwest.....	8	7	8	6	6	7	8	11	10	13	9	9	9	16
Calm.....	1	3	4	4	5	3	2	2	5	2	2	1	3	16
Mean wind force (Beaufort).....	3.4	3.1	3.1	3.0	2.6	2.9	3.0	3.3	3.0	3.3	3.3	3.3	3.2	10
Direction (percentage of 1400 obs.):														
North.....	10	19	18	18	19	19	20	16	19	14	14	13	17	16
Northeast.....	8	12	8	13	11	6	7	5	8	6	8	10	8	16
East.....	6	10	8	8	7	5	2	4	4	3	4	6	6	16
Southeast.....	9	9	5	6	5	4	4	4	5	5	10	6	6	16
South.....	19	11	11	11	9	9	11	10	13	13	16	18	13	16
Southwest.....	28	20	27	21	27	31	30	30	25	32	24	24	26	16
West.....	10	7	11	11	11	15	15	20	13	14	12	12	13	16
Northwest.....	9	10	10	10	8	10	10	10	12	12	10	10	10	16
Calm.....	1	2	2	2	3	1	1	1	1	1	2	1	1	16
Mean wind force (Beaufort).....	3.5	3.3	3.2	3.5	3.2	3.4	3.5	3.8	3.9	3.7	3.5	3.4	3.5	10
34 knots or over (mean number of days).....	1	1	0.8	0.3	0.3	0.3	0.4	0.8	1	1	1.5	2	10.4	48
VISIBILITY														
Days with fog.....	2	2	3	3	3	2	2	1	2	3	1	2	20	30

SEA AREA A

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Pressure, sea level (millibars):												
1/4 of obs. <-----												
Median.....												
1/4 of obs. >-----												
Temperature, air (*F):												
1/4 of obs. <-----												
Median.....	30	29	32	35	42	49	56	57	52	45	38	35
1/4 of obs. >-----	35	33	35	37	45	53	60	60	55	48	41	38
Temperature, mean sea surface *F	37	37	37	40	48	56	64	63	58	52	45	40
Precipitation: Percent of observations with precipitation.	38	35	35	37	42	50	59	60	56	50	45	41
Cloudiness: Total cloud amount in eighths of sky cover:	13	19	12	12	8	8	10	10	9	15	19	19
1/4 of obs. <-----	2	2	1	2	1	1	1	1	1	4	3	4
Median.....	7	6	4	5	3	2	2	5	3	6	6	7
1/4 of obs. >-----	8	7	6	7	6	6	6	6	6	7	7	8
Visibility, Percent of observations:												
<2 miles.....	9		4	12	15	6	9	1	0	4	7	14
<5 miles.....	21		11	14	16	10	15	7	6	9	21	24

SEA AREA B

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Pressure, sea level (millibars):												
1/4 of obs. <-----	1003	1003	1001	1005	1007	1010	1007	1009	1010	1005	1009	1009
Median.....	1012	1015	1012	1012	1015	1015	1011	1014	1015	1013	1017	1016
1/4 of obs. >-----	1025	1023	1024	1020	1022	1020	1017	1019	1023	1020	1024	1023
Temperature, air (*F):												
1/4 of obs. <-----	31	32	34	37	43	51	58	59	55	47	39	36
Median.....	36	35	36	40	46	55	61	62	58	51	43	39
1/4 of obs. >-----	39	38	39	43	50	58	65	65	60	54	46	42
Temperature, mean sea surface *F	38	36	36	38	44	52	60	61	57	52	46	42
Precipitation: Percent of observations with precipitation.	18	17	15	11	11	10	11	11	11	14	18	18
Cloudiness: Total cloud amount in eighths of sky cover:												
1/4 of obs. <-----	3	2	2	1	0	1	1	1	1	2	3	4
Median.....	6	6	6	3	2	2	2	3	3	5	6	7
1/4 of obs. >-----	7	7	7	6	6	6	6	6	6	7	7	8
Visibility, Percent of observations:												
<2 miles.....	5	11	6	8	7	4	2	3	2	2	4	6
<5 miles.....	23	27	21	16	15	13	12	11	11	14	14	26

Median—Half the observations fall below and half above this point.

>—Equal to or more than.

<—Equal to or less than.

>—More than.

<—Less than.

TABLE 8
LOCAL ICE PECULIARITIES

Name	First Ice			End Of Shipping			Open To Shipping			Last Ice			Days No Shipping (Average)	Years With Ice (Percent)	Years Of Record
	Earliest	Average	Latest	Earliest	Average	Latest	Earliest	Average	Latest	Earliest	Average	Latest			
BALTIYSK.-----	5 Nov.	6 Dec.	1 Jan.	N.A.	None	None	None	None	N.A.	18 Feb.	9 Mar.	15 Apr.	See (A)	100	38
BORGHOLM.-----	N.A.	30 Dec.	None	N.A.	13 Jan.	None	None	None	N.A.	None	24 Mar.	N.A.	N.A.	95	N.A.
FAROSUND H' BR.-----	N.A.	21 Jan.	None	N.A.	3 Feb.	None	None	None	N.A.	None	26 Mar.	N.A.	N.A.	80	N.A.
GDANSK.-----	16 Nov.	2 Jan.	None	N.A.	N.A.	N.A.	None	None	N.A.	None	1 Mar.	2 Apr.	52	59	37
HUVDSKAR.-----	3 Nov.	3 Feb.	None	N.A.	7 Feb.	None	None	None	N.A.	None	22 Mar.	N.A.	N.A.	70	N.A.
KALININGRAD.-----	3 Nov.	5 Dec.	11 Jan.	N.A.	N.A.	N.A.	None	None	N.A.	20 Feb.	24 Mar.	20 Apr.	10	100	38
KALMAR.-----	N.A.	29 Dec.	None	N.A.	26 Jan.	None	None	None	N.A.	None	28 Mar.	N.A.	N.A.	99	N.A.
—, CHANNEL N.-----	N.A.	8 Jan.	None	N.A.	4 Feb.	None	None	None	N.A.	None	22 Mar.	N.A.	N.A.	90	N.A.
KARLSKRONA.-----	N.A.	6 Jan.	None	N.A.	1 Feb.	None	None	None	N.A.	None	19 Mar.	N.A.	N.A.	95	N.A.
KLAIPEDA.-----	14 Nov.	9 Jan.	None	N.A.	N.A.	None	None	None	N.A.	None	9 Mar.	N.A.	N.A.	100	N.A.
KOLBRZEG.-----	4 Nov.	16 Dec.	None	N.A.	See (B)	N.A.	N.A.	None	N.A.	30 Jan.	19 Mar.	21 Apr.	2	100	39
KOLASRAGS.-----	22 Dec.	30 Dec.	None	N.A.	See (C)	None	None	None	N.A.	None	11 Feb.	28 Mar.	1	83	39
KRAKELUND.-----	N.A.	7 Jan.	None	N.A.	See (D)	None	None	None	N.A.	None	16 Apr.	13 May	N.A.	92	N.A.
LIEPAJA.-----	10 Nov.	8 Jan.	None	N.A.	See (D)	None	None	None	N.A.	None	1 Mar.	13 Apr.	See (D)	80	17
NORRKÖPING.-----	N.A.	22 Dec.	None	N.A.	2 Jan.	None	None	None	N.A.	None	28 Mar.	N.A.	N.A.	99	N.A.
NYKÖPING.-----	N.A.	27 Nov.	None	N.A.	22 Jan.	None	None	None	N.A.	None	12 Apr.	N.A.	N.A.	100	N.A.
OXELOSUND.-----	N.A.	22 Dec.	None	N.A.	11 Mar.	None	None	None	N.A.	None	5 Apr.	N.A.	N.A.	99	N.A.
OVISI.-----	22 Dec.	9 Jan.	None	6 Mar.	8 Mar.	4 Mar.	None	None	N.A.	None	28 Mar.	12 May	See (E)	N.A.	15
PARNU.-----	6 Nov.	1 Dec.	1 Feb.	24 Nov.	18 Dec.	12 Jan.	16 Mar.	None	27 Apr.	2 Mar.	22 Apr.	20 May	See (F)	100	35
RIGA.-----	5 Dec.	22 Jan.	None	N.A.	6 Feb.	None	None	None	10 Apr.	None	27 Apr.	15 May	N.A.	94	31
RONNE.-----	19 Dec.	21 Jan.	None	N.A.	N.A.	N.A.	None	None	N.A.	None	25 Feb.	8 Apr.	N.A.	91	12
SLITE.-----	N.A.	18 Jan.	None	N.A.	13 Feb.	None	None	None	N.A.	None	12 Mar.	N.A.	N.A.	80	N.A.
STOCKHOLM.-----	30 Nov.	N.A.	None	See (G)	N.A.	N.A.	N.A.	N.A.	See (A)	21 Jan.	N.A.	24 Apr.	N.A.	N.A.	17
STRALSUND.-----	16 Nov.	1 Jan.	None	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	None	4 Mar.	9 Apr.	N.A.	93	30
SWINOUJSCHIE.-----	17 Nov.	22 Dec.	13 Feb.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	19 Dec.	3 Mar.	12 Apr.	1	100	30

Average dates are based on years with ice. "N.A." means data is not available. (A) Icebreakers rarely required. (B) Icebreakers sometimes required in February. (C) Icebreakers required about 31 days annually. (D) Icebreakers not required. (E) Navigable 89% of winters. (F) Navigable 6% of winters. (G) Icebreakers essential in severe winters.

INDEX

Numbers refer to sections

A

Abbekas, 2A-15
 Abruka Saar, 10B-30
 Achterwasser, 7B-12
 Adan, 6C-3
 Adkubben, 6C-3
 Adlergrund, 2C-9
 Afanasjevimalalik, 10B-29
 Agenskalnse, Inlet, 10B-18
 Ahelaid, 10C-16
 Ahlbeck, 7C-7
 Ahus, facilities, 2B-17
 — Harbor, 2B-14
 — —, anchorage, 2B-16
 — —, approaches, 2B-15
 Ainazi, 10B-24
 —, anchorage 10B-32
 Akmenrags, 9B-12
 Algersgrund, 5B-7
 Allebaden, 2B-34
 Alleskar, 2B-25
 Allinge, 2C-11
 Allirahu, islet, 10B-30
 —, rocks, 10B-31
 Almagrundet, 6A-4
 Almas Grund, 6A-4
 Almo, 2B-35
 Almvik, 5A-5
 Alo, 6A-2
 Alvaret Ridge, 3D-6
 Alvsnaabben, anchorage, 6B-8
 Anesbadar, 4B-11
 Angjarnsudden, 3D-14
 Anklam, 7B-15
 Ansekula, 10B-30
 Apollo, 10C-4
 Apollon, 10A-4
 Aposten, 2B-34
 Ar, 4A-12
 Arholma, 6D-1
 —, approach, 6D-3
 —, channel, 6D-7
 —, pilots, 6D-7
 Arko, 5B-1
 Arkobaden, 5B-6
 Arkona, Kap, 7A-1
 Arkona Riff, 7A-5
 Arkosund, 5B-6
 —, anchorage, 5B-19
 — Harbor, 5B-6

Armbagen, 6A-4
 Arnager, 2C-9
 Arnemar, 3C-6
 Arsdale, 2C-10
 Arstadalshammen, 6E-12
 Askrikefjarden, 6D-6
 Aspet, 2B-15
 Aspo (Dalaro), 6B-3
 — (Karlskrona), 2B-33
 Asunden, 4B-8
 Atla Laht, 10A-11
 — —, anchorage 10A-15
 Atmata, river, 9A-11
 Aurgrund, 4B-5
 Avanas, 4C-2

B

Bakkerne Havn, 2C-9
 Baltic, 1-2
 —, fisheries, 1-18
 —, routes, 1-139, 1-140
 Baltiysk, 8C-6
 —, anchorage, 8C-8
 —, facilities, 8C-9
 —, harbor, pilots, 8C-7
 Baltiyskaya Kosa, 8C-1
 Bankhalet, 4B-13
 Barosund, 5A-10
 —, anchorage, 5A-12
 Barshageudd, 4B-14
 Baskemolla, 2B-12
 Bedaron, 6B-5
 Beresinimadilik, 10A-9
 Bergkvara, 3B-3
 Bergo, 5B-18
 Bernati, 9B-7
 Beten, 5B-12
 Binz, 7A-8
 —, anchorage, 7A-9
 Bjarnovik, 2B-29
 Bjorknaabben, 2B-22
 Bjorko, 6D-5
 Bjurhals, 5B-12
 Blackan, 5A-5
 Bla Jungfrun, 3A-2
 Blase, 4A-11
 Blasinge, 3D-15
 Blenheim, 2A-1
 Blido, 6D-5
 Blockholm Sound, 5A-6
 Blockhusudden, 6E-7
 Boda, 3D-14
 Bodabukten, 3D-14
 —, anchorage, 3D-16

Boderne, 2C-9
 Bokosund, 5C-4
 Bolderaya, 10B-17
 — Harbor, 10B-18
 Bollo Islands, 2B-33
 Bolshavn, 2C-11
 Bonsacken, 2B-4
 Boon Island, 2B-26
 Borgholm, facilities, 3D-12
 —, harbor, 3D-11
 Borgo, 5A-7
 Bornholm, 2C-2
 Borrb Church, 2B-8
 Bostri Madalik, 10B-25
 Botildos Breakers, 2B-15
 Botvaldvik, 4B-11
 Botveskar, 6D-3
 Brandsten (Bulleron),
 6A-4
 — (Sandon), 6C-5
 Brankalssund, 5C-5
 Brantevik, 2B-8
 Braviken, 5B-7
 —, anchorage, 5B-19
 Bredgrund, 6B-3
 —, Stora, 5A-9
 Briterne, 4B-11
 Britgrund, 4B-7
 Broa, 4B-5
 Brodstycket, 6C-5
 Brzezno, 8B-5
 Bulan, 6E-11
 Bullerasen, 2B-19
 Bulleron, 6A-4
 Bullupe River, 10B-10
 Bullu Rava, 10B-10
 Bungenas, harbor, 4B-7
 —, promontory, 4B-5
 Bungeor, 4B-5
 Buoyage, Denmark, 1-31
 —, Germany (Soviet Zone),
 1-32
 —, Poland, 1-39
 —, Sweden, 1-24
 —, Uniform System, 1-19
 —, U.S.S.R., 1-44
 Burgsvik, 4A-5
 Burgsviken, 4A-5
 Busnieku, 9C-13
 Byxelkrok, 3D-13

C

Chaldriku, 10A-13
 Chelminek, 7C-12

Chidovi Nova, 10A-4
 Christianso, 2C-2
 —, harbor, 2C-12
 —, islet, 2C-12
 Climatology, 1-132 thru 1-138
 Currents and water level,
 1-121, 1-122
 — — — — Sweden, (south-
 coast), 2-4
 Customs Poland, 1-102
 —, Sweden, 1-101
 —, U.S.S.R., 1-103
 Cypel Oksywski, 8A-6
 — Redlowski, 8A-5
 Czolpino, 7D-15

D

Dalaro, 6B-6
 —, anchorage, 6B-8
 —, channel, 6B-7
 Damman, 3A-2
 Danger areas, 1-118
 Dange River, 9A-8
 Danholm, 7B-10
 Danische Wiek, 7B-11
 — —, anchorage, 7B-16
 Danzig, facilities, 8B-22
 —, Gulf of, 8-1
 —, Port —, 8B-10
 —, — —, depths, 8B-15
 —, — —, harbor, 8B-17
 Danziger Gatt, 6B-7
 Darlowo, 7D-11
 —, facilities, 7D-13
 —, harbor, 7D-12
 Daugava River, 10B-10
 Daugavgriva, 10B-17
 Davids Banke, 2B-4
 Debicki Kanal, 7C-17
 Debina Island, 7C-12
 Degerhamn, facilities, 3D-8
 —, harbor, 3D-7
 Demban, 6A-4
 Denmark, 1-5
 Deppo, 4A-5
 Der Ruden, 7B-4
 — —, anchorage, 7B-16
 — Vilin, 7B-9
 Dievenow River, 7D-1
 Digergrund, 4C-6
 Digerhuvud, 4C-4
 Dirhami Neem, 10C-14

Djupasund Bridge, 2B-33
 Djupekas, 2B-24
 Djuploppet, 4B-8
 Djuron, 5B-7
 Djursholm, 6D-6
 Drag, 3C-3
 Dredge signals, E. Germany,
 1-62
 — —, Poland, 1-76
 — —, Sweden, 1-54
 — —, U.S.S.R., 1-90
 Drigge, 7B-10
 Drottningsskar Citadel, 2B-33
 Dueodde, 2C-9
 Dunson, 2B-30
 Dziwnow, 7D-1
 — Gorny, 7D-1

E

Edstorp, 2B-29
 Eeriku, 10C-12
 Eichstaden Island, 7C-9
 Ekenas, 3B-4
 Ekon, Stora, 2B-30
 Elblag, 8C-14
 Elblaski, Zalew, 8C-14
 Ellebaden Surf, 2B-30
 Elleholm, 2B-24
 Emmaste, 10C-16
 Engelsholm, 5C-5
 Engure, 10B-10
 Enholm, 4B-8
 Enskar (Havrings), 5B-18
 — (Karlshamn), 2B-25
 Eskelen, 2B-30
 Esten, 2B-34
 Estonia, 1-16
 —, deratting, 1-17
 Ettersundet, 5A-10

F

Faarvater Voosikurk, 10C-14
 Fallbadan, Norra, 5B-6
 Falsterbokanalen, 2A-9
 Falsterborev, 2A-1
 Falsterboudde, 2A-1
 Faludden, 4B-13
 Farfarsgrund, 6C-3
 Farjestaden (Braviken),
 5B-7
 —, (Oland), 3D-10

Faro, 4C-6
 — Missloper, 4B-5
 Faron, 4C-2
 Farosund, 4B-5
 —, anchorage, 4B-6
 —, harbor, 4B-5
 Fejan, anchorage, 6D-5
 Femore, 5B-12
 Fifong, 5C-5
 Figeholm, 3C-9
 Finngrundet, 3B-6
 Finnrevet Reef, 3C-6
 Fisheries, 1-18
 Fishing markers, Sweden,
 1-117
 — vessels, U.S.S.R., 1-116
 Fittjakullen, 2B-30
 Five Whistles Corner, 8B-7
 Fjaderholmarna, 6C-5
 Fjalkinge Hills, 2B-15
 Fjardhallan, 6B-3
 Flackeken, 2B-33
 Fladingen, 2B-23
 Flaskosund, 5B-6
 Flatbottarna, 3C-6
 Flytan, 4B-5
 Franska Stenarna, 6B-3
 Frederikso, 2C-12
 Freesendorfer Haken, 7B-11
 Freest, 7B-12
 Frihamnen, 6E-12
 Frisches Haff, 8C-14
 Frisgrund, 10C-11
 Furilden, harbor, 4B-7
 —, island, 4B-7
 Furo, 3C-6
 Furusund, anchorage, 6D-6
 —, channel, 6D-7
 —, island, 6D-5

G

Gaddan, 5C-3
 Galklubb, 5C-5
 Galon, 6A-3
 Gamleby, 5A-5
 Gamlebyviken, 5A-5
 Garpaviken, 2B-33
 Garpen, 3B-4
 Garskullen, 2B-34
 Gasfeten, 2B-30
 Gasfjarden, 5A-5
 —, anchorage, 5A-12

Gaski, 7D-10
 Gaso, 3C-4
 Gastholmsgrund, 6C-5
 Gattet, Norra 4B-5
 Gauja River, 10B-24
 Gdansk, Port of, 8B-10
 —, —, anchorage, 8B-20
 —, —, depths, 8B-15
 —, —, facilities, 8B-22
 —, —, harbor, 8B-17
 —, —, pilots, 8B-19
 Gdynia, Port of, 8A-7
 —, —, anchorage, 8A-17
 —, —, depths, 8A-12
 —, —, facilities, 8A-19
 —, —, harbor, 8A-14
 —, —, pilots, 8A-16
 Genbote, 6B-3
 Germany (Soviet Zone), 1-6
 — — —, deratting, 1-7
 — — —, ice breakers, 1-59
 — — —, regulations, 1-112
 — — —, signals, 1-58
 Getskar, 2B-34
 Gipka, 10B-10
 Gislöv Harbor, 2A-14
 Glebinka Channel, 8A-6
 Glinki, 7C-23
 Glowe, 7A-5
 Gnisvard, 4A-6
 Godnatt Fort, 2B-35
 Golandet, 2B-30
 Gologora, 7D-10
 Gora Tyupa, 9B-7
 Gorki Wschodnie, 8B-23
 Gota Kanal, 5A-11
 Gotham Church, 4B-11
 Gotland, 4-1
 Gotska Sandön, 4C-7
 Graesholm, 2C-12
 Granhamnsfjärden, 6D-2
 Granholm, Västra, 6C-5
 Granitzer Ort, 7A-8
 Granklubben, 5C-5
 Grankullaviken, 3D-13
 Granskar, anchorage, 6D-8
 Gransö (Arko), 5B-6
 —, (Norrlandet), 5A-9
 Gransösund, 5B-6
 Gräsgräshamn, 3D-15
 Grasskären, 5B-8
 Grauten, 4B-7
 Greifswald, 7B-11

Greifswalder Bodden, 7B-1
 — —, anchorage, 7B-16
 — —, depths, 7B-3
 — —, currents, 7B-6
 — —, ice, 7B-7
 — —, Oie, 7B-4
 — —, anchorage, 7B-16
 Grimskallen, 3C-6
 Grimskar, 3B-5
 Gristower Wiek, 7B-10
 Grodska Kepa, 7C-18
 Grodzki Kanal, 7C-17
 Grogarnshuvud, 4B-11
 Gronhogen, 3D-6
 Grono, 5A-5
 Gronska, 6C-3
 Gross Stubber, 7B-3
 Groszes Haff, 7B-12
 Grotlingboud, 4B-13
 Grundet, 4B-8
 Gryfia Wyspa, 7C-18
 Grynge, 4B-12
 Grytan, 3B-5
 Gryts Islands, 5B-8
 Gudhjem, 2C-11
 Gulf of Danzig, 8-1
 — — Riga, approach, 10A-9
 — — —, entrance, 10A-1
 — — —, general, 10-1
 Gullangsberg, 5B-6
 Gunfiring, 1-109
 Gunnarstenarna, 6A-4
 Gunnon, 2B-24
 Guovik, 2B-29
 Gustaf Dalen, 5B-4
 Gustavsberg, 6B-6
 Gvardejskiy, Mys, 9A-5

H

Haademeeste, 10B-25
 — anchorage, 10B-32
 Haapsalu Harbor, 10C-15
 — Laht, 10C-15
 — —, anchorage, 10C-18
 Haff (Lake) See proper name.
 Hagbygrund, 3A-2
 Haldi Nina, 10A-13
 Halgenas, 5A-9
 Hallevik, 2B-22
 Halleviksviken, 2B-22
 Hallshuk, 4A-10
 Hallsviken, anchorage, 5C-10

Hallsviken, harbor, 5C-4
 Halvakssundet, 6C-5
 Hammarbyhamnen, 6E-12
 Hammarbyleden, harbor, 5C-8
 —, seaway, 6E-7
 Hammaren, 2C-6
 Hammarsudden, 4C-6
 Hammarudd, 4A-5
 Hammarudden 4B-11
 Hammerhavnen, 2C-6
 Hammer Odde, 2C-1
 Hammershus, 2C-6
 Hamngrund, 3D-11
 Hamnudden, 4C-7
 Handelo, 5B-8
 Handelö, 5A-5
 Hanöbanken, 2B-4
 Hanöbukten, 2B-2
 Hano Harbor, 2B-23
 — Island, 2B-4
 Hanöund, 2B-23
 Haradskar, 5A-9
 Hargberg, 5B-12
 Hargo, 5B-6
 Harikurk, 10C-12
 —, depths, 10C-3
 —, limits, 10C-1
 Harilaid Island, 10C-12
 — —, anchorage, 10C-18
 —, (Tagamoisa), 10A-10
 Haron Islet, 2B-30
 Harsfjärden, 6A-3
 Hartso, 5B-12
 Hasle, 2C-6
 Hasselo, 5A-9
 Hasslo Island, 2B-33
 Haurevlar, 4B-5
 Havringe, 5B-4
 —, anchorage, 5B-19
 Heinlaid, 10B-29
 —, anchorage, 10B-32
 Helge River, 2B-14
 Hel harbor, 8A-5
 — Peninsula, 8A-5
 Heligholmen, 4B-14
 Helligeder, 2C-6
 Heltermaa, 10C-10
 — anchorage, 10C-18
 Heringsdorf, 7C-7
 Herrhamra, 6B-5
 Herrvik, 4B-11
 Hide, 4B-7
 Hiisaare Nina, 10C-10

Hiiumaa, western side,
10A-13

Hiiumadal, 10A-14
Hjarthalla Hills, 2B-19
Hobulaid, 10C-14
Hoburg, 4A-1
Hoburgs Bank, 4-1
Hoburgsrev, 4A-5
Hogby, 3D-14
Hoggarn, Stora, 6D-6
Hogklint, 4A-7
Hogmarso, 6D-5
Hogskar, 6D-3
Holm Wyspa, 8B-15
Holmebaden, 2B-4
Holmudden, 4C-4
Hornsudde, 3D-13
Horvik, 2B-24
Hossmoggrund, 3B-4
Hundstik Laht, 10A-13
— —, anchorage, 10A-15
Huno Bote, 5A-5
Husarn, Stora, 6B-6
Huvudskar, 6A-4
Hvideodde, 2C-6
Hyperionsgrund, 2B-33

I

Ice, 1-126, 2-5
— reporting, E. Germany,
1-61
— —, Poland, 1-72
— —, Sweden, 1-52
— —, U.S.S.R., 1-86
Ido, 5A-5
—, anchorage, 5A-12
— Stangskar, 5A-5
Idosund, 5A-6
Ioklack, 2B-15
Igelsta, 5C-5
Ina Peninsula, 7C-12
Inre Ortholmen, 2B-26
Inski Nurt, 7C-12
International Icebreaker
Signals, 1-50
Ipsimadilik, 10B-29
Irbenskiy Strait, 10A-1
— —, channels, 10A-9
— —, depths, 10A-3
Ireviken, 4A-10
—, anchorage, 4A-13
Irmgardí Madalik, 10B-25
Ispeudde, 3D-10

J

Jaagurahu, 10A-11
—, anchorage, 10A-15
Jamaja, church, 10A-9
Jarnavik, 2B-29
Jaroslawiec, 7D-14
Jasmund, 7A-5
Jastarnia, 8A-6
Jatterson, Stora, 3C-5
Jelitkowo, 8B-5
Jezioro Dabie, 7C-12
Juodkrante, Beacon, 9A-3
—, harbor, 9A-11
—, tower, 9A-6
Juten, Stora, 5B-7

K

Kaavimadalik, 10B-30
Kaavi Nina, 10B-30
Kadakalaid, 10C-10
Kaglan, 2B-19
Kajakarahu, 10C-15
Kaleste, 10A-13
—, anchorage, 10A-15
Kaliningrad, Port of, 8C-10
—, — —, facilities, 8C-13
—, — —, harbor, 8C-11
—, — —, pilots, 8C-12
Kaliningradskiy Morskoy
Kanal, 8C-10
— Zaliv, 8C-14
Kalmar, 3B-5
—, facilities, 3B-6
Kalmars Djupranna, 3A-2
Kalmarsund, 3A-1
—, anchorages, 3A-11
Kalvo, 6C-5
Kamienski, Zalew, 7D-1
Kampingebukten, 2A-8
Kanal (Canal, Channel) See
proper name.
Kanholmsfjarden, 6B-3
Kanningen, 2B-19
Kap (Cape) See proper name.
Kapellskar, 6D-5
Kapelludden, 3D-14
Kappelshamn, 4A-11
Kappelshamnsvik, 4A-11
Karala, 10A-10
—, anchorage, 10A-15
Kardia, 10C-10
— anchorage, 10C-18
Karehamn, 3D-14
Kareholm, 3D-14
Karlshagen, 7B-12
Karlshall, 2B-24
Karlshamn, Port of, 2B-25
—, — —, anchorage, 2B-27
—, — —, facilities, 2B-28
—, — —, harbor, 2B-26
Karlskrona, Port of, 2B-34
—, — —, anchorage, pilots,
2B-35
—, — —, facilities, 2B-36
—, — —, harbor, 2B-35
Karlsö, Stora, 4A-3
Karnin, pilots, 7B-15
Karvasen, 5C-3
Karwia, 7D-18
Kasebaden, 2B-24
Kaseberga, 2A-19
Kaseberg Head, 2A-15
Kasehuvud Headland, 2A-15
Kassaar, 10C-16
Kassaare Laht, 10C-16
— — approach, 10C-1
Kastellholmen, 2B-26
Kaszubski, Kanal, 8B-15
Kathammarsvik, 4B-11
Kattilo, 5A-10
—, anchorage, 5A-12
Kaunas, 9A-11
Kerju Saar, 10B-30
Kersli Nina, 10C-11
Kessulaid, 10C-13
Kihelkonna Laht, 10A-11
— —, anchorage, 10A-15
Kihnu Krunt, 10B-25
— Saar, harbor, 10B-25
— Vain, 10B-29
Klipsaare, point, 10A-10
Killingholmen, 5A-10
Kingissepp Harbor, 10B-30
Kiriku Nina, 10B-25
Kivik, 2B-13
Kiviks Bredan, 2B-15
Klaipeda, Port of, 9A-7
—, — —, anchorage, 9A-12
—, — —, facilities, 9A-10
—, — —, harbor, 9A-8
—, — —, pilots, 9A-9
Klashallan, 5B-12
Klein Stubber, 7B-3
Kleines Haff, 7B-12
Kleven, 4A-1
Klintehamn, 4A-5

Klints Bank, 4B-3
 Klostergrund, 2A-16
 Klotet, 2B-33
 Klovholmen, 6C-5
 Klubb, 3C-6
 Knaback, 2B-13
 Knolls Grund, 3A-3
 Kofotsgrund, 6B-3
 Kolguste Laht, 10B-31
 Koinastu Laid, 10C-16
 Kolberg, 7D-7
 Kolguskar, 5C-5
 Kolhalsen, 5B-15
 Kolkasrags, 10B-9
 — anchorage, 10B-32
 Kollicker Ort, 7A-5
 Kolobrzeg, 7D-7
 —, facilities, 7D-9
 —, harbor, 7D-8
 Koos, 7B-10
 Kootsaare Nina, 10A-14
 Kopman, 5C-3
 Kopmanholm, 6D-5
 Kopmansgrund, 6A-4
 Kopparholmen, 5B-6
 Kopparstenarna, 4C-7
 Kopu Poolsaar, 10A-13
 Korpen, Vastra, 5B-4
 Korphallan, 5A-7
 Korpholmen, 5B-12
 Korsholm, 5B-12
 Korsö Tower, 6A-2
 Kosa (Spit) See proper name.
 —, peninsula, 7C-9
 Kotkanina, 10B-30
 Krakan, 3D-11
 Krakelund, 3C-9
 Kraknabben, 2B-18
 Krakrevet, 2B-22
 Krakudden, 3D-11
 Krankan, Norra, 5B-4
 Kriegers Flak, 2A-3
 Kristianopel, 3B-3
 Kristianstad, 2B-13
 Krokas, 2B-24
 Kroko, 5A-5
 Krokso, 6C-5
 Krongrundet, 3A-2
 Krooksggrund, 5A-6
 Kroskar beacon, 6B-5
 Kroslin, 7B-12
 Krynica Morska, 8B-23
 Kubassaar, 10B-31

Kudemaa Laht, 10A-12
 — —, anchorage, 10A-15
 Kuggeboda, 2B-33
 Kuggviksskar, 5B-6
 Kuivastu, 10C-13
 — anchorage, 10C-18
 Kullagunden, 2A-14
 Kumaru Laid, 10C-12
 Kummelberg, 5B-6
 Kungsgrundet, 5A-5
 Kungshamn, 5B-7
 Kungsholmen, 2B-33
 Kurisches Haff, 9A-11
 Kurskaya Kosa, 9A-6
 Kurskiy Zaliv, 9A-11
 Kuznica, 8A-6
 Kycklingen, 6B-7
 Kyllaj, 4B-7
 Kyrkudden, 4C-7
 —, anchorage, 4C-8
 Kyrkviken, 4C-6
 — anchorage, 4C-8

L

Lacka Tower, 5C-4
 Lagerholmen, 2B-18
 Laht (Bay) See proper name.
 Laid (Islet) See proper name.
 Laidunina, 10B-31
 Laine, 10C-11
 Lake Malaren, 6E-1
 Lakknallarna, 2B-25
 Lando, 2B-18
 Landsort, 6A-1
 —, anchorage, 6B-8
 Landsortsdjupet, 5A-3
 Landtief, 7B-8
 Langagrund, 2B-4
 Langholmen, 6B-3
 Langoren, 2B-33
 Larinimadalik, 10B-29
 Latvia, 1-14
 — deratting, 1-15
 Laus Holmar, 4B-12
 Lauterbach, 7B-9
 —, anchorage, 7B-16
 Lauterhorn, 4C-4
 —, anchorage, 4C-8
 Lavergrund, 4C-6
 Laxgrund, 2B-24
 Leba, 7D-18
 Ledskar, 5B-15
 Leeltserahu, 10B-30
 Lehtma Nina, 10C-14
 — —, anchorage, 10C-18
 Lesnoy Harbor, 9A-11
 Libau (See Liepaja), 9B-8
 Lickershamn, 4A-10
 Lidingo Bridge, 6E-7
 Lidingon, 6C-5
 Liepaja, Port of, 9B-8
 — anchorage, 9B-13
 — harbor, 9B-9
 — facilities, 9B-11
 — pilots, 9B-10
 Liepajas Ezers, 9B-9
 Lightship signals, Sweden, 1-53
 — —, U.S.S.R., 1-87
 Lilla Karlso, 4A-3
 — Rodbaken, 5B-8
 — Rotholmen, 6B-3
 — Vartan (Stockholm), 6C-5, 6E-7
 Lillhammarsgrund, 5B-15
 Lina inlet, 5C-6
 Lindalssundet, 6C-5
 Lindo Canal, 5B-9
 Listed, 2C-11
 Listershuvud, 2B-23
 Lithuania, 1-10
 — deratting, 1-11
 Liyelupe, river, 10B-10
 Ljugarn, 4B-12
 Ljungskar (Oxelosund), 5B-12
 — (Vino), 5A-5
 Ljusgrund, 5A-9
 Ljustero, 6D-5
 Ljusterohuvud, 6D-6
 Loch, 7B-8
 Lohme, 7A-5
 Lokholm, 6C-5
 Lono, 5B-7
 Lonshuvud, 5A-10
 Loode Nina, 10B-30
 Loonalaide, 10A-10
 Loudden, 6E-12
 Lou Laht, 10A-9
 — —, anchorage, 10A-15
 Lovsgata, 5B-7
 Lubin, 7C-24
 — Church, 7C-8
 Luidja Laht, 10A-13
 — —, anchorage, 10A-15
 Lusarna, 5A-7

M

Madalik (Shoal) See proper name.
 Maglarp Church, 2A-8
 Magnetic disturbances, 1-120
 Majgu, 4B-8
 Maklappen, 2A-1
 Malar, harbor, 5C-5
 Malarstrand, 6E-12
 Mallby Church, 2B-13
 Mallsten, 6B-3
 Maly Przekop, 7C-17
 Manilaid, 10B-25
 Mankow Bend, 7C-12
 Maritime Control Signals,
 E. Germany, 1-68
 — — —, Poland, 1-79
 — — —, U.S.S.R., 1-93
 Maro (Furusund), 6D-5
 — (Gransosund), 5B-6
 Marsviken, 5B-11
 Martwa Wisla, 8B-15
 Masklubbshallan, Norra,
 5B-15
 Masknaggen, 3A-4
 Masknöv, 6B-3
 Matge Islet, 3C-3
 Matsalu Laht, 10C-12
 Matvik, 2B-29
 Matvikshog, 2B-29
 Mazirbe Church, 10B-9
 Meelaluneem Point, 10A-10
 Melnsils, 10B-10
 Melsted, 2C-11
 Mem, 5A-10
 Memel (See Klaipeda), 9A-7
 Merise, 10A-12
 Mersraga Osta, 10B-10
 Mersrags, 10B-10
 Michailovsk, 10A-3
 Midsjobanken, Norra, 3A-3
 —, Sodra, 3A-3
 Miedzzydroje, 7C-24
 Mielenski Przekop, 7C-17
 Mielin Island, 7C-12
 Mielinski Kanal, 7C-9, 7C-12
 Mielizna Zachodnia, 7C-8
 Mielno, 7D-10
 Mie River, 2B-28
 Mierzeja Wislana, 8B-23
 Mikelbaka, 10B-9
 Milgravis, 10B-18

Milzu Kalns, 10B-10
 Minefields, 1-109
 Minesweeper signals,
 E. Germany, 1-63
 — —, Poland, 1-74
 — —, Sweden, 1-55
 Mittgrunden, 3A-2
 Mjolko, 6D-6
 Moderort, 7B-15
 Monstera, 3C-4
 Montu, 10B-30
 — anchorage, 10B-32
 Morbylanga, 3D-9
 Morko, 5C-4
 Morskoy Kanal, 9A-7
 Motala River, 5B-8
 Motlawa, 8B-15
 Muglitzer Ort, 7B-9
 Muhu, 10C-13
 — Vain, central part, 10C-12
 — —, currents, 10C-6
 — —, depths, 10C-3
 — —, ice, 10C-8
 — —, limits, 10C-1
 — —, pilots, 10C-9
 Mustpank, 10A-11
 Mys (Cape) See proper name.
 Mysingeholm, 6B-3
 —, anchorage, 6B-8

N

N. Baden, 5A-6
 Nabban, 4B-12
 Nabbelund, 3D-13
 Narsholmen, 4B-12
 Naskubben, 6D-5
 Nasnabben, Vastra, 2B-19
 Nasrevet, 4A-5
 Nasudden, 4A-5
 Nasypnoy Beacon, 8C-10
 Nattaro, 6A-2
 Navekvarn, 5B-7
 Nedjan, 2B-9
 Nekso, 2C-10
 NEMEDRI, 1-118
 Nida, 9A-6
 —, harbor, 9A-11
 Niechorze, 7D-6
 Nina (Point) See proper name.
 Ninase Pank, 10A-12

Nittonfotsgrund, 6C-3
 Noarootsi, 10C-14
 Nogersund, 2B-23
 Nommkula, 10C-13
 Nordperd, 7A-8
 Nordvaina, 10C-11
 Norra (Northern) See proper name.
 Norre Kaas, 2C-6
 Norresand, 2C-11
 Norrköping, 5B-8
 —, facilities, 5B-10
 —, harbor, 5B-9
 Norrlandet, 5A-5
 Norrtälje, 6D-5
 Norrtäljeviken, 6D-2
 —, anchorage, 6D-8
 Norsholmen, 4C-4
 — anchorage, 4C-8
 Norsklint, 4A-10
 Notholmen, 5C-5
 Nowy Port, 8B-6
 — —, anchorage, 8B-8
 — —, facilities, 8B-9
 — —, harbor, 8B-7
 Nygrund, 5A-10
 Nyköping, Port of, 5B-15
 —, facilities, 5B-17
 —, harbor, 5B-16
 Nykvarnsgrund, 6D-5
 Nynashamn, 6B-5
 Nyrevsudde, 4A-6
 Nyvarp, 6C-5

O

Oaxen, anchorage, 5C-10
 —, harbor, 5C-4
 Oceanography, 1-121 thru
 1-131
 Oder Bank, 7A-3
 Odra River, 7C-12
 Odrzana Lawica, 7A-3
 Oier Riff, 7B-4
 Oil Pollution, 1-108
 Okno, Stora, 3C-4
 Okretowa, Wyspa, 7C-17
 Oland, 3D-2
 Olands Norra Grund, 3D-3
 — — Udde, 3D-13
 — — —, anchorage, 3D-16
 — — rev, 3D-3
 — Sodra Grund, 3A-3

ands Sodra Udde, 3D-1
grundet, 3C-6
ikulaid, 10B-29
anchorage, 10B-32
rissaare, 10C-17
anchorage, 10C-18
rjaku, harbor, 10C-16
rmingelandet, 6C-6
rnavik, 2B-24
rnhokaknosén, 2B-8
ro Sankor, 5A-6
rranas, 3B-3
rsbaken, 5B-15
rtholmen, Yttre, 2B-26
saknallen, 2A-19
skarshamn, 3C-6
anchorage, 3C-7
facilities, 3C-8
s mussaar, pilots, 10C-14
stergarnsholm, 4B-11
sterskar, 6C-3
stra Lerskaret, 6D-3
Roko, 6B-3
anchorage, 6B-8
Torp, 2A-15
Torsöviken, 2B-22
strow Island, 8B-15
sttief, 7B-8
svadersudden, 3C-6
svisi, 10A-1
visu Seklis, 10A-3
xdjupet, 6C-5
xelosund, Port of, 5B-12
facilities, 5B-14
harbor, 5B-13
passage, 5B-12

P

Paatsalu, 10B-29
Palanga, harbor, 9B-7
Pallagrund, 2B-15
Palli Nina, 10A-13
Palmer Ort, 7B-9
Palsundet, 5C-4
Pammana, 10A-12
Nina, 10A-12
Pampus Roadstead, 5B-8
Panga, point, 10A-12
Pape, harbor, 9B-7
Papen Wasser, 7C-12
Papilaid, 10C-13
Paprotno Bend, 7C-12

Parnicki Przekop, 7C-17
Parnu, anchorage, 10B-32
facilities, 10B-28
harbor, 10B-26
pilots, 10B-27
Parnu Jogi, 10B-25
Parnu Laht, approaches,
10B-25
Parseta River, 7D-7
Paskallavik, 3C-5
Paslan, 3C-3
Pataholm, 3C-3
Pavilosta, 9C-8
Peenemunde, 7B-12
Peenemunder Haken, 7B-11
Peene River, channels, 7B-12
southern part, 7B-15
Piaski, 8B-23
Piastowski Kanal, 7C-12
Pihinurme Madalik, 10B-25
Maed, 10B-25
Pikkani, Mys, 10B-25
Pikla Nina, 10B-25
Pilli Ots, 10B-25
Pilotage, E. Germany, 1-105
Poland, 1-106
Sweden, 1-104
U.S.S.E., 1-107
Piltholm, 6B-3
Piltholmsknall, 6B-3
Pionerskiy, 9A-5
Plagurahu, 10C-11
Pleniewo, 8B-17
Pohja Ristna Nina, 10A-13
Poland, 1-8
deratting, 1-9
icebreakers, 1-70
regulations, 1-113
signals, 1-69
Poluostrov Maugalsala,
10B-17
Pomeranian Bay, 7C-1
Poosaspea Neem, 10C-14
Portgrund, 5B-15
Portowy, Kanal, 8B-7
Prastor, 3B-5
Precipitation, 1-136
Pregolya, river, 8C-10
Prejbaden, 2B-34
Primorskiy Zaliv, 8C-6
Prohibited areas, 1-109
Prorer Wiek, 7A-8
anchorage, 7A-9

Protected areas, 1-110
Przekop Wisla, 8B-23
Przemyslowy, Kanal, 8A-14
Puck, 8A-6
Puisu Nina, 10C-12
Pukavik, 2B-24
Pukaviksbukten, 2B-24
Pullapaa Nina, 10C-15
Pussirahu, 10C-10

Q

Quarantine signals, 1-100
Quitziass Riff, 7A-8
Quvarnholm, 3B-5

R

Rabinakalju, 10A-11
Radio apparatus, 1-111
Radioga Channel, 6C-6
Ragaciems, 10B-10
Raghammer Odde, 2C-9
Raihy Laht, 10C-11
anchorage, 10C-18
Ramshall, 5B-8
Ramsi, 10C-14
Ranzow, 7A-5
Raudrahu, 10A-12
Raugi, 10C-13
Reddevitzer Hoft, 7B-9
Rega River, 7D-6
Regulations, 1-108 thru
1-115
Reigi Laht, 10A-14
anchorage, 10A-15
Remmargrund, 6D-5
Rev (Reef) See proper name.
Revsbadorna, 2B-19
Revengegrundet, 6C-3
Revnabben, 2A-16
Revsudden, 3C-3
Revudden, 4A-1
Rewa, 8A-6
Riddarfjarden, 6E-7
Riems, 7B-10
Riff (Reef) See proper name.
Riga, Port of, 10B-11
aids to navigation,
10B-19
anchorage, 10B-21
currents, 10B-15
depths, dangers,
10B-16

- Riga, Port of, entrance,
 10B-17
 —, —, facilities, 10B-23
 —, —, harbor, 10B-18
 —, —, pilots, 10B-20
 Rindo, 6C-5
 Rinuzi, harbor, 10B-18
 Ristna, 10A-13
 Rixhoft, 7D-19
 Rohukula, 10C-12
 — Harbor, 10C-15
 — —, anchorage, 10C-18
 Rojas Osta, 10B-10
 — —, anchorage, 10B-32
 Roken, 6A-4
 Roko, Vastra, 5C-5
 Romeleas, 2A-7
 Romeleklint, 2A-7
 Ronehamn, 4B-13
 Ronne, 2C-7
 —, facilities, 2C-8
 — Banke, 2C-9
 Ronnebyhamn, 2B-30
 —, aids to navigation, 2B-31
 —, dangers in the approaches,
 2B-30
 —, facilities, 2B-32
 Ronneby River, 2B-30
 Roomassaar, 10B-30
 —, anchorage, 10B-32
 —, harbor, 10B-30
 Ror, Stora, 3D-10
 Rorumsklabb, 2B-12
 Routes, 1-139 thru 1-141
 Rowokol, 7D-15
 Rowska Lawica, 7D-18
 Rowy, 7D-18
 Rozewie, 7D-19
 Rostoka Odrzanska, 7C-12
 Rugen Island, 7A-2
 Rugenwalde, 7D-11
 Rugischer Bodden, 7B-2
 Ruhnu Saar, 10B-4
 — —, anchorage, 10B-32
 Rukkirahu, 10C-12
 — anchorage, 10C-18
 Rumpu Nina, 10C-11
 Runmaro, 6B-6
 Runno, 3C-5
 Runo, 6B-7
 Russian Soviet Federal
 Socialist Republic (RSFSR),
 1-12
 Russian Soviet Federal
 Socialist Republic, deratt-
 ing, 1-13
 — — — —, icebreakers,
 1-84
 — — — —, regulations,
 1-114
 — — — —, signals, 1-83
 Rutegrund, 4B-7
 Rute Missloper, 4B-7
 Rutskirke, 2C-6
 Rybachiy, harbor, 9A-11
 Rybitwia Mielizna, 8A-6
 Ryk River, 7B-2
 Ryssberg, 2B-18
 Ryssgrundet, 2A-19
 Ryssudden, 4B-5
 Rzeka Dziwna (Swina), 7D-1
 Rzucewo, 8A-6

 S
 Saar (Island) See proper
 name.
 Saaremaa, western side,
 10A-10
 Saare Nina, 10C-10
 Saaretukk, 10B-31
 St. Marien, tower, 8B-16
 — Olofsholm, 4B-7
 — Peters Cathedral, 10B-23
 Salacgriva, 10B-24
 —, anchorage, 10B-32
 Salgrund, 5B-15
 Salinomme, 10C-16
 Saltknolen, 2B-34
 Salto, 2B-36
 Saltsjobaden, 6B-6
 Saltvik, Stora, 3C-9
 Salvorev, 4C-5
 Sandhammaren, 2A-19
 —, caution, 2-2
 Sandhamn, harbor, 3B-3
 — (Sandon), 6C-1
 — Sound, 6C-6
 Sandhamns Stangskar, 6C-3
 Sandkaas Odde, 2C-10
 Sando Bank, 4C-7
 — Orskar, 3C-5
 Sandon, 6C-1
 —, anchorage, 6C-7
 Sandsankan, 5A-10
 Sandvig, 2C-11
 Sandvik, 3D-13
 Sandviken Harbor, 5B-7
 — (Ronnebyhamn), 2B-31
 Sandvikshamn, 4B-12
 Sankhallan, 5C-5
 Sarkandaugava, 10B-18
 Sassnitz, 7A-6
 —, facilities, 7A-7
 Saterholmen, 5B-7
 Sauga Jogi, 10B-26
 Savo, 5B-18
 Savosund, 5B-18
 Saxarfjarden, Vastra, 6C-5
 Saxsby Nina, 10C-11
 Schaabe, 7A-5
 Schumacher Grund, 7B-3
 Sea and swell, 1-123
 Seanina, 10C-13
 Seehunds Riff, 7A-8
 Segerstad, 3D-15
 Sekluma Kiaules Nugara,
 9A-7
 Selgrahu, 10C-10
 Sellin, 7A-8
 Serbini, 10C-4
 Signals, E. Germany, 1-58
 thru 1-68
 —, Poland, 1-69 thru 1-82
 —, Sweden, 1-49 thru 1-57
 —, U.S.S.R., 1-83 thru 1-94
 Sillasen, 3A-2
 Sillnasudde, 2B-22
 Simpnasklubb, 6D-1
 Simrishamn, 2B-9
 —, anchorage, 2B-10
 —, facilities, 2B-11
 Sjalso, 4A-10
 Skaftet, 5A-5
 Skaggenas, 3A-2, 3C-3
 Skallen, 5A-9
 Skanssund, 5C-5
 Skansudde, 4A-6
 Skare, 2A-8
 Skenholmen, 4B-7
 Skeppsbrohamnen, 6E-12
 Skeppsbron, 6E-7
 Skillinge, 2B-8
 Skrapan, 6B-3
 Skultes Osta, 10B-24
 Slanakullen, 2B-30
 Slatbaken, 5A-10
 Slite, 4B-8
 —, anchorage, 4B-9

- Slite, facilities, 4B-10
 Slitere, 10B-9
 Sloka Church, 10B-10
 Slottsbredden, 3A-2
 Slupia River, 7D-15
 Slupska Lawica, 7A-3
 Smallhalet, 4B-8
 Smojen, 4B-7
 Smojeudd, 4B-7
 Smygehuk, 2A-14
 Snogebaek, 2C-10
 Snubblan, 2A-16
 Snuggholmen, 5A-10
 —, anchorage, 5A-12
 Soderarm, 6D-1
 —, dangers, 6D-3
 Soderbritten, 4B-13
 Sodergrund, 4B-5
 Sodergrundan, 6C-3
 Soderhall, 6B-3
 Soderkoping, 5A-11
 Sodertalje, 5C-5
 —, anchorage, 5C-6
 —, facilities, 5C-7
 Sodra (Southern) See proper name
 Soela, 10C-16
 —, anchorage, 10C-18
 — Vain, 10C-16
 — —, anchorage, 10C-18
 Solvesborg Harbor, 2B-19
 — —, dangers in the approaches, 2B-19
 — —, facilities, 2B-21
 — —, harbor, pilots, 2B-20
 Solvesborgsviken, 2B-19
 Someri Poolsaar, 10B-29
 — —, anchorage, 10B-32
 Sommargrund, 2B-30
 Songu Saar, 10B-25
 Soolarahu, 10C-11
 Sopot, 8B-5
 —, anchorage, 8B-24
 Sorgu Saar, 10B-25
 Sorteodde, 2C-11
 Soru, pier, 10C-16
 Sorve Ots, 10A-9
 — Poolsaar, 10A-9
 — —, anchorage, 10B-32
 — Riff, 10A-9
 Sovietsk, 9A-11
 Spanska Redden, 2A-17
 Sparo, 5A-5
 Sparo, anchorage, 5A-12
 Sparosund, 5A-6
 Spattgrund, 2B-19
 Staboudde, 6D-2
 Staden, 6E-7
 Stadsgarden, 6E-7
 Stadsgardshamnen, 6E-12
 Stadsholmen, 5A-12
 Stahlbrode, 7B-10
 Stangskar, 5A-5
 Stara (Old) See proper name.
 Starno, 2B-24
 Stavklint, 4A-7
 Stavsnas Radio Towers, 6A-2
 Stavstensudde, 2A-8
 —, monument, 2A-10
 Stegeborgsund, 5A-10
 Stegna, 8B-23
 Steingrund, 7B-4
 Steintrendel, 7A-8
 Steko Islet, 2B-31
 Stengrund, Yttre, 3A-2
 Stenkyrkehuk, 4A-10
 Stenshuvud, 2B-13
 Stenskar, islet, 5C-5
 Stepnica, 7C-12
 Stettin, Port of, 7C-13
 Stettiner Haff, 7C-12
 Stevns Klint, 2-2
 Stickskar, 5A-5
 Stilleryd, 2B-24
 Stilo, 7D-18
 Stockholm, E. approach channels, 6C-7
 —, N. — —, 6D-7
 —, S. — —, 6C-6
 Stockholm, Port of, 6E-1
 —, aids to navigation, 6E-8
 —, anchorage, 6E-10
 —, depths, 6E-6
 —, directions, 6E-11
 —, facilities, 6E-12
 —, harbor, 6E-7
 —, ice, 6E-4
 —, pilots, 6E-9
 —, Skargard, 6-1
 Stocksund, 6E-7
 Stolpe Bank, 7A-3
 Stolpmunde, 7D-15
 Stora (Great) See proper name.
 Storgrund, 6D-2
 Storklappen, 5A-9
 Storklappen, anchorage, 5A-12
 Storloppet, 4B-8
 Storm signals, E. Germany, 1-58
 — —, Poland, 1-69
 — —, Sweden, 1-49
 — —, U.S.S.R., 1-83
 Storro, 5C-4
 Storugns, 4A-11
 Stotbotten, 3C-6
 Stra, 4B-5
 Stralsund, eastern approach, 7B-10
 Streckelsberg, 7C-7
 Stubbenkammer, 7A-5
 Stubbskar Beacon, 3C-9
 Stubnitz, 7A-2
 Sturko, 2B-33
 Styrjans, anchorage, 6D-8
 Submarine cables, 1-115
 — signals, E. Germany, 1-98
 — —, Poland, 1-97
 — —, Sweden, 1-95
 — —, U.S.S.R., 1-99
 Sudperd, 7A-8
 —, anchorage, 7A-9
 Sutudden, 2B-26
 Suur Katel, 10B-30
 — —, anchorage, 10B-32
 Suurkuiv, 10A-11
 Suursadam, 10C-10
 —, anchorage, 10C-18
 Svaneke, 2C-10
 Svangel, 6C-3
 Svanhalla, 3B-3
 Svartgrund, 2A-19
 Svarthall, 5C-4
 Svarto, 3C-4
 Svartoren, 3C-4
 Svarvnaset, 4A-11
 Svedudden, 6E-11
 Svenska Bjorn, 6A-4
 — Hogarna, 6A-4
 — Stenarna, 6A-4
 Sventoji, harbor, 9B-7
 Svingrund, 4A-12
 Sweden, 1-3
 —, buoyage, 1-24
 —, deratting, 1-4
 —, icebreakers, 1-50
 —, prohibited areas, 1-109
 —, protected —, 1-110

Sweden, signals, 1-49
 Swibno, 8B-23
 Swidna Zatoka, 7C-8
 Swieta Kepa, 7C-24
 Swina, Stara, 7C-12
 Swinemunde, Port of, 7C-8
 Swinhof, 7C-24
 Swinoujscie, Port of, 7C-8
 —, anchorage, 7C-10
 —, facilities, 7C-11
 —, harbor, 7C-9
 Sysneudd, 4B-11
 Szczecin, Port of, 7C-13
 —, aids to navigation, 7C-19
 —, anchorage, 7C-21
 —, approaches, 7C-12
 —, depths, 7C-17
 —, facilities, 7C-23
 —, harbor, 7C-18
 —, pilots, 7C-20
 Szczecinski, Zalew, 7C-12

T

Tagalaht, 10A-12
 —, anchorage, 10A-15
 Tagamoisa Poolsaar, 10A-10
 Taggen, 2B-15
 Tahku Nina, 10B-25
 Tahkuna Nina, 10A-14
 Tammistu, 10A-13
 Taran, Mys, 9A-1
 Tarno Harbor, 2B-29
 — Island, 2B-29
 Tat, 2C-12
 Teglkas, 2C-6
 Tejn, 2C-11
 Telegrafholm, 6C-5
 Telisna Nina, 10C-14
 Temperature, 1-134
 Territorial waters, U.S.S.R., 1-114
 Thiessow, 7A-8
 Tides, 1-121
 Tillingenabben, 3C-3
 Timmernabben, 3C-3
 Tingstade Radio, 4-1
 Tinuri Nina, 10C-16
 Tiriu, 10A-9
 Tjarhovet, 3B-6
 Tjarven, 6D-3
 Tjocko, 6D-5

Tjurko, 2B-33
 Tjurkosten, 2B-34
 Tohvri Nina, 10A-13
 Tokenasudde, 3D-13
 Tonnenbank, channel, 7B-12
 Torhamn, 2B-37
 Torhamnsudde, 2B-37
 Torila Ots, 10B-25
 Tornhullshallan, 4C-5
 Torsburgen, 4B-11
 Torso, 2B-22
 Tostamaa Laht, 10B-29
 Tosteburga Pines, 2B-20
 Tradgardsgrund, 3A-2
 Traffic signals, E. Germany, 1-67
 — —, Poland, 1-82
 — —, U.S.S.R., 1-94
 Tralhavet, 6C-5
 —, anchorage, 6C-7
 Trelleborg, caution, 2A-2
 —, facilities, 2A-13
 — Harbor, 2A-11
 — —, anchorage, 2A-12
 — —, pilots, 2A-12
 Triigi Harbor, 10C-16
 — —, anchorage, 10C-18
 — Nina, 10C-16
 Tromper Wiek, 7A-5
 Trosa, anchorage, 5C-10
 —, harbor, 5C-4
 Troskeln, 6A-4
 Trutbadan, 5B-15
 Trzebiez, 7C-12
 Tujas Pier, 10B-24
 Tvaren, 5B-18
 —, anchorage, 5B-19
 Tviklova, Vastra, 6D-5
 Tyfo, 6D-5
 Tynningo, 6C-5

U

Udriklaid, 10B-31
 Ullahau, 4C-4
 Undva, 10A-12
 Upplango, 3C-9
 Usedom, 7B-11
 Usedomer Steintrendel, 7C-7
 U.S.S.R., hydrographic info., 1-119
 Ustka, 7D-15
 —, facilities, 7D-17

Ustka, harbor, 7D-16
 Utgrund, 3A-2
 Utgrundet, 3A-2
 Utholmen, 4A-6
 —, anchorage, 4A-13
 Utklippan, 2B-4
 Utklipporna, 2B-4
 Utlangan, 2B-33
 Uto, 6A-2
 Uuskniv, 10A-10
 Uzava, 9C-8

V

Vaddo Kasberg, 6D-5
 Vaderon, 3C-3
 Vagga, 2B-29
 Vahase Saar, 10B-30
 Vaike Vain, 10C-17
 — —, anchorage, 10C-19
 Vain (Strait) See proper name.
 Vainakari, 10C-16
 Vaiste Laht, 10B-29
 — —, anchorage, 10B-32
 Valar, 4A-5
 Valdemarsvik, 5A-9
 Valdemarsviken, 5A-9
 Vallersvik, 6D-6
 Valleviken, 4B-7
 Vallo, 3C-5
 Vamo, 2B-35
 Vandberg, 4B-14
 Vang, 2C-6
 Vanneberga, 2B-15
 Varholmsudde, 3D-16
 Varmdolandet, 6C-5
 Vartahamnen, 6E-12
 Vartan, Stora, 6C-5
 Vasteras, anchorage, 5C-8
 —, facilities, 5C-9
 Vasterbaden, 5A-7
 Vastergarn, 4A-6
 Vastervik, 5A-6
 —, harbor, 5A-7
 —, facilities, 5A-8
 Vastra (Western) See proper name.
 Vato, 6D-5
 Vatta Poolsaar, 10B-30
 Vaxholm, 6D-6
 —, anchorage, 6D-8
 Vaxlet, 6D-5

Veiserahu, 10B-30
 Venta River, 9C-9
 Ventspils, Port of, 9C-9
 —, anchorage, 9C-14
 —, facilities, 9C-12
 —, harbor, 9C-10
 —, pilots, 9C-11
 Veritasgrund, 7B-8
 Verkebacksviken, 5A-5
 Vetela Laht, 10B-31
 — —, anchorage, 10B-32
 — Nina, 10B-30
 Vetestenen, 2A-14
 Vettekulla, 2B-29
 Vialmsudd, 4A-12
 Vidus Varti, 9B-8
 Vlinakari, 10C-16
 Viire Kurk, anchorage,
 10C-18
 — —, depths, 10C-3
 — —, limits, 10C-1
 Viirelaid, 10C-13
 Vik, 2B-12
 Vika, Stora, 5C-4
 Vikbolandet, 5A-12
 Viksten, 6B-3
 Vilsandi, 10A-11
 Vindbadan, 6A-4
 Vindhamn, 2B-27
 Vinkelgrund, 5A-6
 Vinkovi, 10A-3
 Vino, 5A-5
 Vinterklasen, 5B-12
 Virbo, 3C-9
 Virtsu, 10C-13
 — Harbor, 10C-13
 — —, anchorage, 10C-18
 — Vain, 10C-13

Visby, Port of, 4A-8
 —, facilities, 4A-9
 Visibility, 1-138
 Viskar Tower, 5B-1
 Vislinskiy Zaliv, 8C-14
 Vistula River, 8B-6
 Vitemolla, 2B-13
 Vitudden, 5A-7
 Vohilaid, 10C-10
 Voirahu, 10C-10
 Voosikurk, anchorage,
 10C-18
 —, approach, 10C-14
 —, limits, 10C-1
 Vormsi, 10C-11

W

Weik, 7B-11
 Westerplatte, 8B-9
 Wielki Zalew, 7B-12
 Wieprza River, 7D-11
 Wietki Karw, 7C-12
 Windau, 9C-9
 Winds and weather, 1-133
 — — —, Sweden (south coast),
 2-3
 Wislany Zalew, 8C-14
 Wisla River, 8B-6
 — Smiala, 8B-23
 Wladyslawowo, 8A-5
 —, anchorage, 8A-20
 Wolgast, 7B-13
 —, facilities, 7B-14
 Wolin, harbor, 7C-24
 Wyspa (Island) See proper
 name.

Y

Yantarnyy, 8C-15
 Yngsjo, 2B-13
 Ystad Harbor, 2A-16
 — —, anchorage, 2A-17
 — —, facilities, 2A-18
 Ytterholmen, 4B-13
 Yttre (Outer) See proper
 name.
 Yxlan, 6D-5

Z

Zakret Pieciu Gwizdkow,
 8B-7
 Zalew (Gulf) See proper
 name.
 Zaliv (Gulf) See proper name.
 Zaitniken, 8C-2
 Zapadnaya Dvina, entrance,
 10B-17
 Zarnowiec, 7D-18
 Zatoka Pomorska, 7C-1
 — —, currents, 7C-5
 — —, depths, 7C-3
 — —, ice, 7C-6
 — Pucka, 8A-6
 — —, anchorage, 8A-20
 — Skoszevska, 7D-1
 Zelonogradsk, 9A-5
 Zickerer See, 7B-9
 — —, anchorage, 7B-16
 Zickersches Hoft, 7B-9
 Ziegelgraben, 7B-10
 Ziemupe, church, 9B-12
 Zinnowitz, 7C-7
 Zudar, 7B-9

CONVERSION TABLES

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

FATHOMS TO METERS

Fathoms	0	1	2	3	4	5	6	7	8	9
0	0.00	1.83	3.66	5.49	7.32	9.14	10.97	12.80	14.63	16.46
10	18.29	20.12	21.95	23.77	25.60	27.43	29.26	31.09	32.92	34.75
20	36.58	38.40	40.23	42.06	43.89	45.72	47.55	49.38	51.21	53.03
30	54.86	56.69	58.52	60.35	62.18	64.01	65.84	67.67	69.49	71.32
40	73.15	74.98	76.81	78.64	80.47	82.30	84.12	85.95	87.78	89.61
50	91.44	93.27	95.10	96.93	98.75	100.58	102.41	104.24	106.07	107.90
60	109.73	111.56	113.39	115.21	117.04	118.87	120.70	122.53	124.36	126.19
70	128.02	129.85	131.67	133.50	135.33	137.16	138.99	140.82	142.65	144.47
80	146.30	148.13	149.96	151.79	153.62	155.45	157.28	159.11	160.93	162.76
90	164.59	166.42	168.25	170.08	171.91	173.74	175.56	177.39	179.22	181.05

METERS TO FEET

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

METERS TO FATHOMS

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	0.55	1.09	1.64	2.19	2.73	3.28	3.83	4.37	4.92
10	5.47	6.01	6.56	7.11	7.66	8.20	8.75	9.30	9.84	10.39
20	10.94	11.48	12.03	12.58	13.12	13.67	14.22	14.76	15.31	15.86
30	16.40	16.95	17.50	18.04	18.59	19.14	19.68	20.23	20.78	21.33
40	21.87	22.42	22.97	23.51	24.06	24.61	25.15	25.70	26.25	26.79
50	27.34	27.89	28.43	28.98	29.53	30.07	30.62	31.17	31.71	32.26
60	32.81	33.36	33.90	34.45	35.00	35.54	36.09	36.64	37.18	37.73
70	38.28	38.82	39.37	39.92	40.46	41.01	41.56	42.10	42.65	43.20
80	43.74	44.29	44.84	45.38	45.93	46.48	47.03	47.57	48.12	48.67
90	49.21	49.76	50.31	50.85	51.40	51.95	52.49	53.04	53.59	54.13

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